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NUCLEAR ENERGY INSTITUTE

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April 28, 2003

Dr. William D. Beckner, Program Director
Operating Reactor Improvements Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Dr. Beckner:

Enclosed is TSTF-359, Revision 9, "Increase Flexibility in Mode Restraints." This TSTF incorporates the NRC's responses to comments 8 and 20 in the April 4, 2003, Federal Register Notice of Availability, and clarifies some minor differences between the model safety evaluation and TSTF-359, Revision 8. We have discussed the contents of this revision with NRC staff.

We encourage NRC to post Revision 9 on their web site and use this revision as their basis for review of license amendments to adopt the mode restraints initiative. This will provide for consistency of licensee submittals, and simplify NRC's review process.

Please contact me at (202) 739-8081 or Biff Bradley at (202) 739-8138 if you have any questions.

Sincerely,

Anthony R. Pietrangelo

Anthony R. Pietrangelo

Enclosure: TSTF-359, Revision 9

c: Patricia Coates
Stewart L. Magruder, NRR/DRPM
Technical Specification Task Force

Industry/TSTF Standard Technical Specification Change Traveler

Increase Flexibility in MODE Restraints

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

Classification 1) Technical Change Recommended for CLIIP?: Yes

Priority 1)High

Simple or Complex Change: Complex Correction or Improvement: Improvement

Industry Contact: Hoffman, Donald (301) 984-4400 donaldh@excelservices.com

See attached.

Revision History

OG Revision 0 Revision Status: Closed

Revision Proposed by: RITSTF

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 30-Aug-99

Owners Group Comments
(No Comments)

Owners Group Resolution: Superceeded Date:

OG Revision 1 Revision Status: Closed

Revision Proposed by: RITSTF

Revision Description:
Revision 1 was created to incorporate the comments of the RITSTF. The major changes include the deletion of the Tables from the Traveler and the determination that the proposed change is not an exception to SR 3.0.1, but rather a failure to meet SR 3.0.1.

Owners Group Review Information

Date Originated by OG: 06-Oct-99

Owners Group Comments
(No Comments)

Owners Group Resolution: Superceeded Date:

OG Revision 2 Revision Status: Closed

Revision Proposed by: TSTF

OG Revision 2 Revision Status: Closed

Revision Description:
Revision 2 was created to incorporate the comments of the TSTF and the industry. The major changes include 1) changes to the Bases to make the terminology consistent with the LCO and SR requirements, and 2) other editorial changes.

Owners Group Review Information

Date Originated by OG: 24-Nov-99

Owners Group Comments
(No Comments)

Owners Group Resolution: Superceeded Date:

TSTF Review Information

TSTF Received Date: 25-Oct-99 Date Distributed for Review

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

TSTF Comments:

(No Comments)

TSTF Resolution: Date:

OG Revision 3 Revision Status: Closed

Revision Proposed by: TSTF

Revision Description:
Revision 3 was created to incorporate further comments of the TSTF and the Industry. The major changes include (1) deletion of SR 3.0.4 and Bases SR 3.0.4 insert regarding failure of SR 3.0.1 due to the inconsistency of interpretation of meaning of the insert and the determination that the interrelationships need no further explanation, and (2) minor wording changes for clarity.

TSTF Review Information

TSTF Received Date: 08-Nov-99 Date Distributed for Review 08-Nov-99

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

TSTF Comments:

(No Comments)

TSTF Resolution: Approved Date: 09-Nov-99

NRC Review Information

NRC Received Date: 17-Nov-99

Final Resolution: Superceded by Revision Final Resolution Date: 14-Feb-00

TSTF Revision 1 Revision Status: Closed

Revision Proposed by: TSTF

Revision Description:
The Description and Justification are completely replaced to address the NRC's request for sufficient information to support creation of an SER for this change.

TSTF Review Information

TSTF Received Date: 15-Feb-00 Date Distributed for Review 15-Feb-00

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

TSTF Comments:

(No Comments)

TSTF Resolution: Superceeded Date: 26-Jun-00

TSTF Revision 2 Revision Status: Closed

Revision Proposed by: TSTF

Revision Description:
Revised Description, Justification, and Inserts to address Industry comments.

TSTF Review Information

TSTF Received Date: 26-Jun-00 Date Distributed for Review 26-Jun-00

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

TSTF Comments:

(No Comments)

TSTF Resolution: Superceeded Date: 16-Aug-00

TSTF Revision 3 Revision Status: Closed

Revision Proposed by: RITSTF

Revision Description:
The following changes were made:

Proposed Change:
1. First paragraph, following "(b) After performance of a risk evaluation", Added: after performance of a risk evaluation, consideration of the results, and establishment of risk management actions if appropriate.

2. Third paragraph, replaced second sentence with following: The risk evaluation may use quantitative, qualitative, or blended approaches, and should be consistent with the approach of Regulatory Guide 1.182, "Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants". The results of the risk evaluation shall be considered in determining the acceptability of the mode change, and any corresponding risk management actions.

3. Deleted last sentence of third paragraph.

4. Fourth paragraph: Deleted sentence beginning "Acceptable risk", and next sentence (1.174 reference).

TSTF Revision 3 **Revision Status: Closed**

Replaced with "Regulatory guide 1.182 addresses general guidance for conduct of the risk evaluation, quantitative and qualitative guidelines for establishing risk management actions, and example risk management actions. These include actions to plan and conduct other activities in a manner that controls overall risk, increased risk awareness by shift and management personnel, actions to reduce the duration of the condition, actions to minimize the magnitude of risk increases (establishment of backup success paths or compensatory measures), and determination that the proposed mode change is unacceptable."

5. Last sentence of paragraph is clarified to state that actions may include changing modes. "determine safest course of action" is replaced with "determine the risk impact, and the need for risk management actions as appropriate."

Justification:

1. Second paragraph, first sentence. The phrase "minimizing risk" is replaced with "maintaining acceptable plant risk."

2. Paragraph beginning "In addition." The reference to the CEOG end state report is eliminated and the following is substituted, "the additional mitigation capability provided by steam driven systems at higher modes." The statement that a risk evaluation would only be required if the risk is increased is circular logic and is deleted.

Effect on Risk-Informed Analysis:

1. Replaced the first paragraph with the following: "A quantitative, qualitative, or blended risk evaluation should be performed to assess the risk impact of the mode change, based on the specific plant configuration at that time. The following table, developed for CE plants, shows the results of a qualitative risk analysis taking into account the impact on initiating event frequency and mitigation capability as a function of plant mode. From such an evaluation, systems/components can be identified whose unavailability results in an equal or greater risk impact in Modes 2-4 than in Mode 1. For these systems/components, it would be generally acceptable to utilize the 3.0.4 exemption. However, the applicability of the table should be reviewed with respect to the actual plant configuration at that time. Entry into more than one 3.0.4 exemption at the same time, or for plant systems/components identified in the table as potentially higher risk for mode 1 operation, would require a more rigorous analysis, and consideration of risk management actions as discussed in Regulatory Guide 1.182."

2. Deleted the second paragraph.

3. Deleted paragraph beginning, "Based upon a general review of the San Onofre PRA."

TS changes: - Inserts 1, 2, 3, and 4

1. Revised Inserts to reflect changes described in "Proposed Changes," above.

TSTF Review Information

TSTF Received Date: 16-Aug-00 Date Distributed for Review 16-Aug-00

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

TSTF Comments:

(No Comments)

TSTF Revision 3 Revision Status: Closed

TSTF Resolution: Date:

TSTF Revision 4 Revision Status: Closed

Revision Proposed by: TSTF

Revision Description:
Revised the justification to apply to all NUREGs, not just the CEOG NUREG. Revised the LCO 3.0.4 and SR 3.0.4 changes to require determination of the acceptability of MODE change, expanded MODE descriptions to address both PWRs and BWRs, eliminated reference to the San Onofre evaluation and substituted Owners Groups evaluations,

TSTF Review Information

TSTF Received Date: 20-Aug-00 Date Distributed for Review

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

TSTF Comments:

(No Comments)

TSTF Resolution: Superceeded Date: 22-Jan-01

TSTF Revision 5 Revision Status: Closed

Revision Proposed by: RITSTF

Revision Description:
1 - Indicated that the attached reports (Attachments 1 - 4) are generic and that the individual plants may perform plant specific evaluations along with the TSTF.

2 - Included a statement in the Bases: "The following is a list of those systems that have been generically determined to be risk significant systems and do not typically have the LCO 3.0.4 flexibility allowed."

System	MODE or other Specified Condition in the Applicability
Diesel Generators	1, 2, 3, 4, 5, 6

(Owners Groups Specific Information Will Be Provided In Each NUREG Bases)

3. Added a sentence in the TSTF that clearly states that the Bases will be plant specific.

4. Included a statement that the LCO 3.0.4 exception typically only applies to systems and components and that values and parameters are not addressed by LCO 3.0.4.

5. Made statement in the Bases that the list of parameter / value exclusions can be found in other "licensee controlled documents."

6. Provided a statement in the Bases that TSTF-359 acknowledges the previous flexibility some plants may have had for LCO 3.0.4 exceptions and application and that each plant may use plant-specific justification to retain those previous flexibilities.

TSTF Review Information

TSTF Received Date: 22-Jan-01 Date Distributed for Review 02-Mar-01

TSTF Revision 5 Revision Status: Closed

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

TSTF Comments:

(No Comments)

TSTF Resolution: Approved Date: 02-Mar-01

NRC Review Information

NRC Received Date: 02-Mar-01

NRC Comments:

The NRC provided questions in a meeting between the NRC and the RITSTF on 7/30/01 and in a Request for Additional Information dated 8/14/01.

Final Resolution: Superceded by Revision

TSTF Revision 6 Revision Status: Closed

Revision Proposed by: RITSTF

Revision Description:
TSTF-359, Revision 6 - Draft for Industry Review and NRC Comment

This revision was developed for Industry and NRC review and comment. This is not the formal TSTF-359, Revision 6.

This revision made many changes that were proposed in large part by comments from the Industry and comments from the NRC, both at the 7/30/01 NRC / RITSTF meeting and in the NRC Request for Additional Information dated 8/14/01. The changes address:

1) Consistency of terminology

2) NRC comments and questions

3) Additional clarification and justification

4) Standardization of OG Tables, and

5) Bases revisions to support plant-specific adoption.

TSTF-359, Revision 6 - Final

This revision incorporates the eight NRC comments dated 12/17/01 on the TSTF-359, Revision 6 - Draft for NRC Comment as they were discussed and resolved by the RITSTF and the NRC on 12/19/01. This changed the justification with clarifications or additional information and did not affect the TS or Bases.

This revision provides an LCO 3.0.4.c allowance to address the issue of retaining current NUREG and plant-specific value and parameter LCO 3.0.4 exceptions. This revision also clarifies that the LCO 3.0.4 allowance may not be applied to systems and components on the individual Owners Groups tables without prior NRC

TSTF Revision 6 Revision Status: Closed

review and approval.

TSTF Review Information

TSTF Received Date: 29-Sep-01 Date Distributed for Review 30-Jan-02

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

TSTF Comments:

(No Comments)

TSTF Resolution: Approved Date: 01-Mar-02

NRC Review Information

NRC Received Date: 22-Feb-02

NRC Comments:

In a letter dated 4/26/2002, the NRC requested changes to TSTF-359. TSTF considering.

Final Resolution: NRC Requests Changes: TSTF Will Revise

TSTF Revision 7 Revision Status: Closed

Revision Proposed by: TSTF

Revision Description:
In a letter dated April 26, 2002, the NRC requested changes to TSTF-359, Rev. 6. TSTF-359, Rev. 7 addresses the request by making the following changes:

The list of systems in the Bases to which LCO 3.0.4.b cannot be applied is deleted. Notes are added to the applicable specifications which prohibit the use of LCO 3.0.4.b for the conditions described in the table.

The list of systems in the Bases to which LCO 3.0.4 does not apply is deleted. Notes are added to the applicable specifications which state that LCO 3.0.4.c is applicable. LCO 3.0.4.c is modified to reflect this change.

A change was made to SR 3.0.4 to allow reliance on an SR 3.0.3 risk assessment when changing MODES.

The NUREG markups have been replaced with markups on Revision 2.1 pages.

Based on a review of the draft Revision 7, the NRC requested three additional changes:

1) References to a risk "evaluation" are changed to a risk "assessment." The term "assess" is used instead of "evaluate" to be consistent with 10 CFR 50.65(a)(4).

2) LCO 3.0.4.c is revised from "When an allowance is stated in individual specifications" to "When an allowance is stated in the individual value or parameter Specification."

3) LCO 3.0.4.b is revised from "After performance of a risk evaluation for inoperable system and components. . . " to "After performance of a risk assessment addressing inoperable system and components. . . "'

TSTF Review Information

TSTF Received Date: 17-Jun-02 Date Distributed for Review 21-Jun-02

TSTF Revision 7 Revision Status: Closed

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

TSTF Comments:

Draft 7 originally approved by TSTF on 6/21/2002.

Final draft 7 approved on 7/10/2002.

TSTF Resolution: Approved Date: 10-Jul-02

NRC Review Information

NRC Received Date: 10-Jul-02

NRC Comments:

Based on comments made during the FRN, the NRC requested changes.

Final Resolution: Superceded by Revision Final Resolution Date: 02-Aug-02

TSTF Revision 8 Revision Status: Closed

Revision Proposed by: TSTF

Revision Description:
The following changes have been made to TSTF-359, Rev. 7:

1. Two editorial corrections are made to the Inserts.

a. Insert 6 (which is now incorporated in Insert 2, see Item 8 below) is revised to eliminate the word "that" from the sentence, "SR 3.0.4 does not restrict changing MODES or other specified conditions of the Applicability when a Surveillance that has not been performed within the specified Frequency, provided the requirement to declare the LCO not met has been delayed in accordance with SR 3.0.3."

b. Insert 8 is revised to delete the sentence, "This exception is acceptable due to the significant conservatism incorporated into the specific activity limit, the low probability of an event which is limiting due to exceeding this limit, and the ability to restore transient specific activity excursions while the unit remains at, or proceeds to, power operation." This sentence duplicates a sentence left in the Technical Specification markup and, therefore, is not needed in Insert 8.

2. The changes made to BWR/4 LCO 3.4.9, RHR Shutdown Cooling System - Cold Shutdown, and BWR/6 LCO 3.4.10, RHR Shutdown Cooling System - Cold Shutdown, are eliminated. These changes were erroneously included in Revision 7 and are not supported by the generic risk assessments performed to support TSTF-359. This also eliminates BWR/4 Inserts 1 and 1B and BWR/6 Inserts 1 and 1B. The remaining inserts are renumbered and the markup revised. The changes are eliminated from the list of affected Technical Specifications.

3. A list of Technical Specification systems to which LCO 3.0.4.b may not be applied is added to the justification. This list was based on discussions between the Owners Groups and the NRC to resolve differences between the analyses performed to support TSTF-359. This list of systems was contained in the Bases for LCO 3.0.4 in TSTF-359, Revision 6 and is consistent with the changes made to the ITS in TSTF-359, Revision 7, except as Noted in Item 2, above. The justification is expanded to describe the differences between the list of systems and the Owners Group reports in the Attachments.

4. The LCO 3.0.4.b Notes are revised to clarify their application. Several of the BWR/4 and BWR/6 Notes

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stated that LCO 3.0.4.b is not applicable when entering MODE 2 from MODE 3. BWRs are capable of moving from MODE 4 to MODE 2 without passing through MODE 3, so the Note was confusing and not consistent with supporting analyses which considered entering MODE 2 from any lower (e.g., larger number) MODE. After review, it was determined that the qualification "when entering MODE [X] from MODE [X-1]" was not needed in any case. LCO 3.0.4 does not apply during a shutdown, so LCO 3.0.4.b would only be desired to be applied when entering a MODE from a lower MODE. The qualification was left in the Bases to provide information, or added if it didn't exist, but it is not needed for the Notes. Also, the LCO 3.0.4.b Not Applicable Notes on the PWR ECCS - Shutdown specifications stated, "when entering MODE 4." The BWOG and WOG ECCS - Shutdown specifications are only applicable in MODE 4, so no reference to MODES is necessary.

5. During the review, it was Noted that the BWOG Owners Group report stated that LCO 3.0.4.b could not be applied to Decay Heat Removal (DHR) when entering MODE 4 because of the need to able to inject coolant into the RCS. In the B&W design, the DHR system performs two functions, RCS decay heat removal and ECCS low pressure injection. The LCO 3.0.4.b Not Applicable Note had been added to LCO 3.4.6, RCS - MODE 4. It was determined that the Note is more appropriately placed on LCO 3.5.3, ECCS - Shutdown. This is consistent with the Owners Group report and with the changes made to the other PWR specifications.

6. Previous revisions of TSTF-359 revised SR 3.0.4 to included the statements:
When an LCO is not met due to Surveillances not having been met, entry into a MODE or other specified condition in the Applicability shall only be made:

a. When the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time;

b. After performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering the MODE or other specified condition in the Applicability, and establishment of risk management actions, if appropriate. Individual Specifications may prohibit the use of this provision; or

c. When an allowance is stated in the individual value, parameter, or other Specification.

Items a, b, and c are also stated in LCO 3.0.4, and extensive discussion of the application of these three items is included in the Bases of LCO 3.0.4, but no such discussion existed in the Bases for SR 3.0.4. On further review, it was determined that a more accurate way to state SR 3.0.4 would be:

When an LCO is not met due to Surveillances not having been met, entry into a MODE or other specified condition in the Applicability shall only be made in accordance with LCO 3.0.4.

This statement is more accurate because when an LCO is not met, LCO 3.0.4 controls the MODE transition. This change also eliminates repeating the Bases discussion and avoids the confusion of having SR 3.0.4 and LCO 3.0.4 both apply when an LCO is not met due to Surveillances not being met.

7. Based on comments made during the Federal Register Notice for Comment of TSTF-359, Rev. 7, the NRC requested that the statement in LCO 3.0.4 and SR 3.0.4 that restricts the application to PWR MODES 1, 2, 3, 4 and BWR MODES 1, 2, 3 be deleted. This results in the following changes:

a. LCO 3.0.4 is revised to delete the NUREG-1430, 1431, and 1432 sentence, "LCO 3.0.4 is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4," and the NUREG-1433 and 1434 sentence, "LCO 3.0.4 is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, and 3."

b. SR 3.0.4 is revised to delete the NUREG-1430, 1431, and 1432 sentence, "SR 3.0.4 is only applicable for

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entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4," and the NUREG-1433 and 1434 sentence, "SR 3.0.4 is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, and 3."

c. The LCO 3.0.4 Reviewer's Note which discusses the conditions for adopting the restricted LCO 3.0.4 applicability is deleted.

d. The SR 3.0.4 Reviewer's Note which discusses the conditions for adopting the restricted LCO 3.0.4 applicability is deleted.

e. The Bases of LCO 3.0.4 are revised to eliminate discussion of the restricted applicability and to eliminate discussion of plant-specific Notes which may be needed as a result of the review required by the Reviewer's Note.

f. The Bases of SR 3.0.4 are revised to eliminate discussion of the restricted applicability.

g. The Proposed Change section of the Justification is revised to discuss the disposition of plant-specific Notes that may have been added to plant Technical Specifications as a result of the review required by the Reviewer's Note.

h. The Bases of LCO 3.0.4 are expanded to describe the evaluations needed to justify the use of LCO 3.0.4.b in the cold shutdown and refueling MODES. The justification explains the relationship between 10 CFR 50.65(a)(4), NUMARC 91-03, and NUMARC 91-06 (shutdown risk).

i. Several of the Notes stating the LCO 3.0.4.b is not applicable are expanded to specify the MODE transitions for which LCO 3.0.4.b may not be used. This change is necessary because of the expansion of the applicability of LCO 3.0.4. The Bases for the Notes already state the MODES to which the Notes apply.

j. With the expansion of the applicability of LCO 3.0.4 and SR 3.0.4, the phrase, "that are part of a shutdown of the unit" requires additional explanation to clarify whether entering the Refueling MODE or changes in the specified conditions in the Applicability are part of a shutdown. The PWR LCO 3.0.4 and SR 3.0.4 Bases are revised to state, "In this context, a unit shutdown is defined as a change in MODE or other specified condition in the Applicability when transitioning from MODE 1 to MODE 2, MODE 2 to MODE 3, MODE 3 to MODE 4, and MODE 4 to MODE 5." The BWR LCO 3.0.4 and SR 3.0.4 Bases are revised to state, "In this context, a unit shutdown is defined as a change in MODE or other specified condition in the Applicability when transitioning from MODE 1 to MODE 2, MODE 2 to MODE 3, and MODE 3 to MODE 4."

k. The Owners Group reports included as attachments were developed assuming that LCO 3.0.4 and SR 3.0.4 were only applicable in MODES 1 - 4 for PWRs and 1-3 for BWRs. The Justification is expanded to address the expansion in the applicability of LCO 3.0.4 and SR 3.0.4. Additional information has been added to the justification to address the differences between the LCO 3.0.4 and SR 3.0.4 applicability and the analyses performed in the Owners Groups reports.

8. The CTS markup and inserts are combined to clarify the presentation. Insert 1 now replaces all of LCO 3.0.4, Insert 2 replaces all of SR 3.0.4, Insert 3 replaces all of the LCO 3.0.4 Bases, and Insert 4 replaces all of the SR 3.0.4 Bases. Differences from Revision 2.1 of the ISTS NUREGs are shown using red-line/strikeout. As a result, Inserts 5 and 6 are eliminated.

9. The Bases discussion was revised to make the discussion easier to follow. The description of the LCO 3.0.4.b analysis was reorganized to place similar information together, and duplicative information was removed.

10. TSTF-359, Rev. 7, included the following addition to the LCO 3.0.4 Bases, "Upon entry into a MODE or

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other specified condition in the Applicability with the LCO not met, LCO 3.0.1 and LCO 3.0.2 require entry into the applicable Conditions and Required Actions for no more than the duration of the applicable ACTIONS Completion Time or until the LCO is met." These statements were added at the NRC's request. However, they are not accurate. When a Condition is entered, that Condition is not exited when the Completion Time expires. The wording is in conflict with TS Section 1.3, Completion Times. The DESCRIPTION, 1st paragraph, last sentence, states: "An ACTIONS Condition remains in effect and the Required Actions apply until the Condition no longer exists or the unit is not within the LCO Applicability."

There is no accurate and unambiguous way to state this desired reinforcement of the applicability of LCO 3.0.1 and LCO 3.0.2 without repeating all of LCO 3.0.1 and LCO 3.0.2 in the LCO 3.0.4 Bases, or to state, "Upon entry into a MODE or other specified condition in the Applicability with the LCO not met, the provisions of LCO 3.0.1 and LCO 3.0.2 shall be followed." This addition is unnecessary and confusing. LCO 3.0.1 and LCO 3.0.2 always apply. As there is no benefit to adding the statement and correcting it to be accurate will be verbose, duplicative, and confusing, it is deleted.

TSTF Review Information

TSTF Received Date: 11-Nov-02 Date Distributed for Review 20-Nov-02

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

TSTF Comments:

(No Comments)

TSTF Resolution: Approved Date: 01-Dec-02

NRC Review Information

NRC Received Date: 02-Dec-02

Final Resolution: Superceded by Revision Final Resolution Date: 04-Apr-03

TSTF Revision 9 Revision Status: Active Next Action:

Revision Proposed by: NRC

Revision Description:
On April 4, 2003, the NRC published the Notice of Availability for TSTF-359, encouraging licensees to adopt the change under the Consolidated Line Item Improvement Process.

The NRC made two modifications to TSTF-359, Revision 8, in response to comments, as well as one other editorial change. These three changes have been incorporated into TSTF-359, Rev. 9.

Change #1: In response to Comment #8, the following is added to the Bases of LCO 3.0.4 as the next to last paragraph of the LCO 3.0.4 Bases:

Upon entry into a MODE or other specified condition in the Applicability with the LCO not met, LCO 3.0.1 and LCO 3.0.2 require entry into the applicable Conditions and Required Actions until the Condition is resolved, until the LCO is met, or until the unit is not within the Applicability of the Technical Specification.

This wording is slightly different from that published in response to Comment #8. The phrase "for no more than the duration of the applicable ACTIONS Completion Time" is replaced with "until the Condition is resolved," in order to correct a potential conflict with Example 1.3-2. Minor gramatical changes are made which do not affect the intent. This was discussed with the NRC and they agreed that it does not change the intent of the inserted paragraph .

Change #2: In response to Comment #20, a sentence is added after the first sentence of paragraph #4 of the LCO 3.0.4 Bases, which begins, "The risk assessment may use quantitative, qualitative, or blended approaches ..." and ends , "assessed and managed." The inserted sentence states:

The risk assessment, for the purposes of LCO 3.0.4 (b), must take into account all inoperable Technical Specification equipment regardless of whether the equipment is included in the normal 10 CFR 50.65(a)(4) risk assessment scope.

This sentence was edited from the version in the FRN in order to be consistent with the Bases. "TS" is changed to "Technical Specifications" and reference to "licensee" is removed as it is not appropropriate for plant-specific Bases. However, the intent is not changed.

Change #3: On page 6 of the model Safety Evaluation (SE), there is a quote of the revised LCO 3.0.4. This quote has some differences from the Insert for LCO 3.0.4 in TSTF-359, Revision 8. Based on discussions with the NRC, LCO 3.0.4 in Revision 9 is consistent with the TSTF-359, Revision 8. This includes retaining the word "other" in LCO 3.0.4.c as was presented in the Revision 8. However, there is one difference to which the NRC and the TSTF agreed:

LCO 3.0.4.b in the insert ends, "...actions, if appropriate. Individual Specifications may prohibit the use of this provision; or". This is revised to "... action, if appropriate; exceptions to this Specification are stated in the individual Specifications, or" This wording is consistent with similar wording in LCO 3.0.3 and SR 3.0.2.

This also necessitated a change to the "Proposed Change" section of the justification to show the revised wording.

Other Issues:

The model SE for TSTF-359 included the list of "higher risk" equipment from the Owners Group assessments included in the Traveler. As discussed in the justification and the model SE, not all of the listed systems had LCO 3.0.4.b prohibition notes applied and not all systems had prohibition notes applied in all of the listed Modes. The NRC confirmed that the list in the model SE was taken from the assessments because the assessments form the technical justification for the Traveler, but it was not the intent of the NRC to require any deviation from the markups in TSTF-359.

At the top of page 20 of the model SE there is a quote from the LCO 3.0.4 Bases. The quote is taken from Revision 7 of TSTF-359 and in Revision 8 and 9, the information is retained but not presented exactly as in the quote. The NRC agreed that this difference is not significant and licensee's are not expected to revise the LCO 3.0.4 Bases to be consistent with the model SE.

TSTF Review Information

TSTF Received Date: 22-Apr-03 Date Distributed for Review 22-Apr-03

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

TSTF Comments:

(No Comments)

TSTF Revision 9 **Revision Status: Active** **Next Action:**

TSTF Resolution: Approved Date: 25-Apr-03

NRC Review Information

NRC Received Date: 28-Apr-03

Affected Technical Specifications

LCO 3.0.4	LCO Applicability	
LCO 3.0.4 Bases	LCO Applicability	
SR 3.0.4	SR Applicability	
SR 3.0.4 Bases	SR Applicability	
Action 3.8.1	AC Sources - Operating	
Action 3.8.1 Bases	AC Sources - Operating	
Action 3.5.3	ECCS - Shutdown	NUREG(s)- 1430 1431 1432 Only
Action 3.5.3 Bases	ECCS - Shutdown	NUREG(s)- 1430 1431 1432 Only
Action 3.3.17	PAM Instrumentation	NUREG(s)- 1430 Only
Action 3.3.17 Bases	PAM Instrumentation	NUREG(s)- 1430 Only
Action 3.3.18	Remote Shutdown Sysem	NUREG(s)- 1430 Only
Action 3.3.18 Bases	Remote Shutdown Sysem	NUREG(s)- 1430 Only
Action 3.4.15.A	RCS Leakage Detection Instrumentation	NUREG(s)- 1430 Only
Action 3.4.15.A Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1430 Only
Action 3.4.15.B	RCS Leakage Detection Instrumentation	NUREG(s)- 1430 Only
Action 3.4.15.B Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1430 Only
Action 3.4.16	RCS Specific Activity	NUREG(s)- 1430 Only
Action 3.4.16 Bases	RCS Specific Activity	NUREG(s)- 1430 Only
Action 3.7.4.A	AVVs	NUREG(s)- 1430 Only
Action 3.7.4.A Bases	AVVs	NUREG(s)- 1430 Only

Action 3.7.5	EFW System	NUREG(s)- 1430 Only
Action 3.7.5 Bases	EFW System	NUREG(s)- 1430 Only
Action 3.4.12	LTOP System	NUREG(s)- 1431 1432 Only
Action 3.4.12 Bases	LTOP System	NUREG(s)- 1431 1432 Only
Action 3.7.5	AFW System	NUREG(s)- 1431 1432 Only
Action 3.7.5 Bases	AFW System	NUREG(s)- 1431 1432 Only
Action 3.3.3	PAM Instrumentation	NUREG(s)- 1431 Only
Action 3.3.3 Bases	PAM Instrumentation	NUREG(s)- 1431 Only
Action 3.3.4	Remote Shutdown System	NUREG(s)- 1431 Only
Action 3.3.4 Bases	Remote Shutdown System	NUREG(s)- 1431 Only
Action 3.4.11	Pressurizer PORVs	NUREG(s)- 1431 Only
Action 3.4.11 Bases	Pressurizer PORVs	NUREG(s)- 1431 Only
Action 3.4.15.A	RCS Leakage Detection Instrumentation	NUREG(s)- 1431 Only
Action 3.4.15.A Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1431 Only
Action 3.4.15.B	RCS Leakage Detection Instrumentation	NUREG(s)- 1431 Only
Action 3.4.15.B Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1431 Only
Action 3.4.16	RCS Specific Activity	NUREG(s)- 1431 Only
Action 3.4.16 Bases	RCS Specific Activity	NUREG(s)- 1431 Only
Action 3.6.8.A	Hydrogen Recombiners (Atmospheric, Subatmospheric, Ice Condenser, and Dual)	NUREG(s)- 1431 Only
Action 3.6.8.A Bases	Hydrogen Recombiners (Atmospheric, Subatmospheric, Ice Condenser, and Dual)	NUREG(s)- 1431 Only
Action 3.6.9.A	HMS (Atmospheric, Ice Condenser, and Dual)	NUREG(s)- 1431 Only
Action 3.6.9.A Bases	HMS (Atmospheric, Ice Condenser, and Dual)	NUREG(s)- 1431 Only
Action 3.7.4.A	ADVs	NUREG(s)- 1431 Only
Action 3.7.4.A Bases	ADVs	NUREG(s)- 1431 Only
Action 3.3.1.B	RPS Instrumentation - Operating (Analog)	NUREG(s)- 1432 Only
Action 3.3.1.B	RPS Instrumentation - Operating (Digital)	NUREG(s)- 1432 Only

Action 3.3.1.B Bases	RPS Instrumentation - Operating (Analog)	NUREG(s)- 1432 Only
Action 3.3.1.B Bases	RPS Instrumentation - Operating (Digital)	NUREG(s)- 1432 Only
Action 3.3.1.D	RPS Instrumentation - Operating (Digital)	NUREG(s)- 1432 Only
Action 3.3.1.D Bases	RPS Instrumentation - Operating (Digital)	NUREG(s)- 1432 Only
Action 3.3.1.E	RPS Instrumentation - Operating (Analog)	NUREG(s)- 1432 Only
Action 3.3.1.E Bases	RPS Instrumentation - Operating (Analog)	NUREG(s)- 1432 Only
Action 3.3.2.B	RPS Instrumentation - Shutdown (Analog)	NUREG(s)- 1432 Only
Action 3.3.2.B	RPS Instrumentation - Shutdown (Digital)	NUREG(s)- 1432 Only
Action 3.3.2.B Bases	RPS Instrumentation - Shutdown (Analog)	NUREG(s)- 1432 Only
Action 3.3.2.B Bases	RPS Instrumentation - Shutdown (Digital)	NUREG(s)- 1432 Only
Action 3.3.2.D	RPS Instrumentation - Shutdown (Analog)	NUREG(s)- 1432 Only
Action 3.3.2.D	RPS Instrumentation - Shutdown (Digital)	NUREG(s)- 1432 Only
Action 3.3.2.D Bases	RPS Instrumentation - Shutdown (Analog)	NUREG(s)- 1432 Only
Action 3.3.2.D Bases	RPS Instrumentation - Shutdown (Digital)	NUREG(s)- 1432 Only
Action 3.3.4.C	ESFAS Instrumentation (Analog)	NUREG(s)- 1432 Only
Action 3.3.4.C Bases	ESFAS Instrumentation (Analog)	NUREG(s)- 1432 Only
Action 3.3.4.E	ESFAS Instrumentation (Analog)	NUREG(s)- 1432 Only
Action 3.3.4.E Bases	ESFAS Instrumentation (Analog)	NUREG(s)- 1432 Only
Action 3.3.5.B	ESFAS Instrumentation (Digital)	NUREG(s)- 1432 Only
Action 3.3.5.B Bases	ESFAS Instrumentation (Digital)	NUREG(s)- 1432 Only
Action 3.3.5.D	ESFAS Instrumentation (Digital)	NUREG(s)- 1432 Only
Action 3.3.5.D Bases	ESFAS Instrumentation (Digital)	NUREG(s)- 1432 Only
Action 3.3.6.B	DG - LOVS (Analog)	NUREG(s)- 1432 Only
Action 3.3.6.B Bases	DG - LOVS (Analog)	NUREG(s)- 1432 Only
Action 3.3.7.B	DG - LOVS (Digital)	NUREG(s)- 1432 Only
Action 3.3.7.B Bases	DG - LOVS (Digital)	NUREG(s)- 1432 Only
Action 3.3.11	PAM Instrumentation (Analog)	NUREG(s)- 1432 Only

Action 3.3.11	PAM Instrumentation (Digital)	NUREG(s)- 1432 Only
Action 3.3.11 Bases	PAM Instrumentation (Analog)	NUREG(s)- 1432 Only
Action 3.3.11 Bases	PAM Instrumentation (Digital)	NUREG(s)- 1432 Only
Action 3.3.12	Remote Shutdown System (Analog)	NUREG(s)- 1432 Only
Action 3.3.12	Remote Shutdown System (Digital)	NUREG(s)- 1432 Only
Action 3.3.12 Bases	Remote Shutdown System (Analog)	NUREG(s)- 1432 Only
Action 3.3.12 Bases	Remote Shutdown System (Digital)	NUREG(s)- 1432 Only
Action 3.4.11	Pressurizer PORVs	NUREG(s)- 1432 Only
Action 3.4.11 Bases	Pressurizer PORVs	NUREG(s)- 1432 Only
Action 3.4.15.A	RCS Leakage Detection Instrumentation	NUREG(s)- 1432 Only
Action 3.4.15.A Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1432 Only
Action 3.4.15.B	RCS Leakage Detection Instrumentation	NUREG(s)- 1432 Only
Action 3.4.15.B Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1432 Only
Action 3.4.16	RCS Specific Activity	NUREG(s)- 1432 Only
Action 3.4.16 Bases	RCS Specific Activity	NUREG(s)- 1432 Only
Action 3.6.8.A	Hydrogen Rcombiners (Atmospheric and Dual)	NUREG(s)- 1432 Only
Action 3.6.8.A Bases	Hydrogen Rcombiners (Atmospheric and Dual)	NUREG(s)- 1432 Only
Action 3.6.9.A	HMS (Atmospheric and Dual)	NUREG(s)- 1432 Only
Action 3.6.9.A Bases	HMS (Atmospheric and Dual)	NUREG(s)- 1432 Only
Action 3.7.4.A	ADVs	NUREG(s)- 1432 Only
Action 3.7.4.A Bases	ADVs	NUREG(s)- 1432 Only
Action 3.5.1	ECCS - Operating	NUREG(s)- 1433 1434 Only
Action 3.5.1 Bases	ECCS - Operating	NUREG(s)- 1433 1434 Only
Action 3.5.3	RCIC System	NUREG(s)- 1433 1434 Only
Action 3.5.3 Bases	RCIC System	NUREG(s)- 1433 1434 Only
Action 3.3.3.1	PAM Instrumentation	NUREG(s)- 1433 Only
Action 3.3.3.1 Bases	PAM Instrumentation	NUREG(s)- 1433 Only

Action 3.3.3.2	Remote Shutdown System	NUREG(s)- 1433 Only
Action 3.3.3.2 Bases	Remote Shutdown System	NUREG(s)- 1433 Only
Action 3.3.6.3.A	LLS Instrumentation	NUREG(s)- 1433 Only
Action 3.3.6.3.A Bases	LLS Instrumentation	NUREG(s)- 1433 Only
Action 3.4.6.A	RCS Leakage Detection Instrumentation	NUREG(s)- 1433 Only
Action 3.4.6.A Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1433 Only
Action 3.4.6.B	RCS Leakage Detection Instrumentation	NUREG(s)- 1433 Only
Action 3.4.6.B Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1433 Only
Action 3.4.6.D	RCS Leakage Detection Instrumentation	NUREG(s)- 1433 Only
Action 3.4.6.D Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1433 Only
Action 3.4.7	RCS Specific Activity	NUREG(s)- 1433 Only
Action 3.4.7 Bases	RCS Specific Activity	NUREG(s)- 1433 Only
Action 3.4.8	RHR and Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1433 Only
Action 3.4.8 Bases	RHR and Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1433 Only
Action 3.6.3.1.A	Primary Containment Hydrogen Recombiners	NUREG(s)- 1433 Only
Action 3.6.3.1.A Bases	Primary Containment Hydrogen Recombiners	NUREG(s)- 1433 Only
Action 3.6.3.2.A	Drywell Cooling System Fans	NUREG(s)- 1433 Only
Action 3.6.3.2.A Bases	Drywell Cooling System Fans	NUREG(s)- 1433 Only
Action 3.6.3.4.A	CAD System	NUREG(s)- 1433 Only
Action 3.6.3.4.A Bases	CAD System	NUREG(s)- 1433 Only
Action 3.7.3.A	DG [1B] SSW System	NUREG(s)- 1433 Only
Action 3.7.3.A Bases	DG [1B] SSW System	NUREG(s)- 1433 Only
Action 3.3.3.1	PAM Instrumentation	NUREG(s)- 1434 Only
Action 3.3.3.1 Bases	PAM Instrumentation	NUREG(s)- 1434 Only
Action 3.3.3.2	Remote Shutdown System	NUREG(s)- 1434 Only
Action 3.3.3.2 Bases	Remote Shutdown System	NUREG(s)- 1434 Only
Action 3.4.7.A	RCS Leakage Detection Instrumentation	NUREG(s)- 1434 Only

Action 3.4.7.A Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1434 Only
Action 3.4.7.B	RCS Leakage Detection Instrumentation	NUREG(s)- 1434 Only
Action 3.4.7.B Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1434 Only
Action 3.4.7.D	RCS Leakage Detection Instrumentation	NUREG(s)- 1434 Only
Action 3.4.7.D Bases	RCS Leakage Detection Instrumentation	NUREG(s)- 1434 Only
Action 3.4.8	RCS Specific Activity	NUREG(s)- 1434 Only
Action 3.4.8 Bases	RCS Specific Activity	NUREG(s)- 1434 Only
Action 3.6.3.1.A	Primary Containment Hydrogen Recombiners	NUREG(s)- 1434 Only
Action 3.6.3.1.A Bases	Primary Containment Hydrogen Recombiners	NUREG(s)- 1434 Only
Action 3.6.3.2.A	Primary Containment and Drywell Hydrogen Ignitors	NUREG(s)- 1434 Only
Action 3.6.3.2.A Bases	Primary Containment and Drywell Hydrogen Ignitors	NUREG(s)- 1434 Only
Action 3.6.3.3.A	Drywell Purge System	NUREG(s)- 1434 Only
Action 3.6.3.3.A Bases	Drywell Purge System	NUREG(s)- 1434 Only

JUSTIFICATION

Description

ITS LCO 3.0.4 is revised to allow entry into a MODE or other specified condition in the Applicability while relying on the associated ACTIONS, provided that there is risk assessment performed which justifies the use of LCO 3.0.4, the ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time, or an NRC approved allowance is provided in the Specification to be entered. The current ITS LCO 3.0.4 allows entry into a MODE or a specified condition in the Applicability, while relying on the associated ACTIONS, only if the ACTIONS permit continued operation in the MODE or other specified condition in the Applicability for a unlimited period of time, or if an NRC approved allowance is provided in the Specification to be entered. SR 3.0.4 is revised to reflect the concepts of the change to LCO 3.0.4. The applicability of LCO 3.0.4 and SR 3.0.4 is expanded to include transition into all MODES or other specified conditions in the Applicability, except when required to comply with ACTIONS or that are part of a shutdown of the unit.

Background

LCO 3.0.4 states, "When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time." The allowance to enter MODES or specified conditions in the Applicability while relying on ACTIONS is given because ACTIONS which permit continued operation of the unit for an unlimited period provide an acceptable level of safety for continued operation. This is without regard to the status of the unit before or after the MODE change.

The allowances of LCO 3.0.4 are based on NRC Generic Letter 87-09 which states with respect to unnecessary restrictions on MODE changes, “Specification LCO 3.0.4 unduly restricts facility operation when conformance with Action Requirements provides an acceptable level of safety for continued operation. For an LCO that has Action Requirements permitting continued operation for an unlimited period of time, entry into an operation MODE or other specified condition of operation should be permitted in accordance with the Action Requirements."

In the development of ITS, many improvements were made to LCO 3.0.4 including clarification of its applicability regarding normal shutdown and Required Action shutdowns, and MODE changes during Cold Shutdown and Refueling Operations. During ITS development, almost all the LCOs with Completion Times greater than or equal to 30 days, and many of the LCOs with Completion Times greater than or equal to 7 days, were given individual LCO 3.0.4 exceptions. During many plant specific ITS conversions, individual plants provided justifications for other LCO 3.0.4 exceptions. These specific exceptions allow entry into a MODE or specified condition in the Applicability while relying on these ACTIONS. A Reviewer’s Note exists in LCO 3.0.4 and SR 3.0.4 which requires a plant-specific analysis of the applicability of LCO 3.0.4 and SR 3.0.4 and the application of plant-specific restrictions prohibiting MODE changes if the ACTIONS to be entered do not provide adequate compensatory measures.

Need for Change

ITS LCO 3.0.4 and SR 3.0.4 are still overly restrictive. The startup of a unit is frequently delayed due to the current restrictions of LCO 3.0.4. For example, a single maintenance activity that is almost complete can cause significant delays and changes in the previously well thought out plans for returning the unit to service. In such situations, allowing the unit to enter the MODE or other specified condition in the Applicability would allow the work to be completed while reducing the likelihood of human error caused by expediting the completion of required Surveillances and maintenance activities.

This proposed change would provide standardization and consistency to the use and application of LCO 3.0.4. Currently there are numerous variations of LCO 3.0.4 requirements in the Technical Specifications of individual plants. Additionally, the ITS NUREGs are not totally consistent in their treatment of LCO 3.0.4. The LCO 3.0.4 for all the ITS NUREGs is currently worded exactly the same. However, each ITS NUREG has different LCO 3.0.4 Not Applicable statements throughout due to (1) the carryover from the old STS NUREGs which had different individual LCO 3.0.4 Not Applicable statements and (2) the negotiated LCO 3.0.4 Not Applicable statements during the development of the ITS NUREG and the plant specific ITS for plants of that Owners Group that were included in the ITS NUREG. Some plants have plant-specific Notes restricting changing MODES as a result of the review conducted in accordance with the LCO 3.0.4 and SR 3.0.4 Reviewer's Notes. These MODE restriction Notes vary between plants, even between plants of similar design, depending on the results of the plant-specific review that was performed. This proposed change will provide consistency and standardization in addressing the requirements of LCO 3.0.4 and SR 3.0.4 internally to each ITS NUREG, between all the ITS NUREGs, and to plant-specific implementations. Additionally, per GL 87-09, when using the LCO 3.0.4 Not Applicable allowance for changing MODES or other specified conditions in the Applicability with inoperable equipment while relying upon the provisions of the ACTIONS statements, plants were required to ensure an acceptable level of safety for the plant was maintained and to exercise good practice in determining when to use LCO 3.0.4 Not Applicable allowances. The application of these requirements was performed inconsistently throughout the Industry partially due to a lack of specific guidance. This proposed change will further ensure consistency in appropriate levels of risk assessment for plant configuration allowances for the application of LCO 3.0.4.

Proposed Change

The proposed change revises LCO 3.0.4 and SR 3.0.4. LCO 3.0.4 is revised to state, "When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall only be made (a) When the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time; (b) After performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering the MODE or other specified condition in the Applicability, and establishment of risk management actions, if appropriate; exceptions to this Specification are stated in the individual Specifications, or (c) When an allowance is stated in the individual value, parameter, or other Specification. SR 3.0.4 is revised to state, "Entry into a MODE or other specified condition in the Applicability of an LCO shall only be made when the LCO's Surveillances have been met within their specified Frequency, except as provided by SR 3.0.3. When an LCO is not met due to Surveillances not having been met, entry into a MODE or other specified condition in the Applicability shall only be made in accordance with LCO 3.0.4."

The current LCO 3.0.4 allowance is retained as LCO 3.0.4.a without the need for risk assessment because the Required Actions which allow indefinite operation already satisfy the safety function.

The concept of the LCO 3.0.4 Not Applicable Notes are retained as LCO 3.0.4.c without the need for risk assessment because the NRC approves these specific value, parameter, or other allowances in the Standard Technical Specifications and plant specific Technical Specifications. The LCO 3.0.4.c allowances appear as Notes modifying the applicable Specifications.

All existing LCO 3.0.4 exceptions are removed with this change. The addition of Notes to some Specifications prohibiting the use of LCO 3.0.4.b and the addition of a Note to the RCS Specific Activity Specification allowing the use of LCO 3.0.4.c are justified generically. Individual plant specific allowances or prohibitions regarding LCO 3.0.4 must be justified separately.

In addition to the change described above, SR 3.0.4 is modified to state that SR 3.0.4 prohibits entry into a MODE or other specified condition in the Applicability of an LCO unless the LCO's Surveillances have been met with in their specified Frequency, "except as provided by SR 3.0.3."

LCO 3.0.4 and SR 3.0.4 state that their provisions are only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4 for PWRs and MODES 1, 2, and 3 for BWRs. LCO 3.0.4 contains a Reviewer's Note requiring a plant-specific evaluation and the possible addition of Notes in order to adopt this restricted applicability of LCO 3.0.4 and SR 3.0.4. The LCO 3.0.4 and SR 3.0.4 applicability restriction is deleted, as is the LCO 3.0.4 Reviewer's Note, by this change. Any plant-specific Notes restricting MODE changes added as a result of the evaluation required by the Reviewer's Note are also deleted. The provisions of LCO 3.0.4.b may be used to change MODES or other specified conditions in the Applicability while relying on ACTIONS in all MODES (unless otherwise explicitly restricted). This applies a consistent, risk informed basis in all conditions when changing MODES or other specified conditions in the Applicability while relying on ACTIONS, except when applying LCO 3.0.4.a or LCO 3.0.4.c.

The Bases of LCO 3.0.4 and SR 3.0.4 are revised to explain the use of the new LCO 3.0.4 allowance and to reflect the other changes.

Justification

The addition of LCO 3.0.4.b, which allows entry into a MODE or other specified condition in the Applicability while relying on ACTIONS based on a risk assessment, is reasonable based on many factors. The licensee, and particularly the licensee management, is always responsible for maintaining overall plant configuration and safety. Developments in the Maintenance Rule and other Industry/NRC initiatives (including the configuration risk management programs) enhance the tools available to licensees to assess the risk associated with various plant configurations. This change is a logical step of requiring licensees to assess the application of LCO 3.0.4 allowances in light of the newly available tools and information.

The risk assessment may consider a variety of factors, but will focus on managing plant risk. Consideration would be given to the probability of completing restoration such that the requirements of the LCO would be met prior to the ACTIONS requiring that the Applicability be exited. The assessment may also establish appropriate compensatory measures to enhance safe and effective operations until restoration of compliance with the LCO. The proposed change would provide the flexibility of not restricting which MODES can be entered while relying on the ACTIONS, as do the current LCO 3.0.4 exceptions, but would add the requirement to assess the risks prior to making the MODE change when using LCO 3.0.4.b. The change will also require risk to be considered when utilizing LCO 3.0.4.b to change any MODE or other specified condition in the Applicability, not just the startup and operating MODES. These assessments are not currently required by LCO 3.0.4. In addition, the Completion Times provide a limit to how long a licensee could be in a MODE or specified condition of the Applicability without meeting the LCO requirements.

When an LCO is not met, the licensee must restore compliance with the LCO consistent with the requirements of the Technical Specifications. This restoration may include corrective maintenance. 10CFR50.65 requires that licensees assess the effect equipment maintenance will have on the plant's capability to perform safety functions before beginning any maintenance activity on structures, systems, or components within the scope of the maintenance rule. The final rule clarifies that these requirements apply under all conditions of operation, including shutdown, and that the assessments are to be used so that the increase in risk that may result from the maintenance activity will be managed to ensure that the plant is not inadvertently placed in a condition of significant risk. NRC Regulatory Guide 1.182, Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants," endorses the guidance of NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Section 11, as revised in February 2000, as an acceptable approach to meet 10 CFR 50.65(a)(4). Section 11 of NUMARC 93-01 addresses assessing and managing risk in both the operating MODES and during shutdown conditions. The risk assessments described by NUMARC 93-01 for shutdown conditions reference the guidance in NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management."

Section 11.3.1 of NUMARC 93-01 addresses assessment process, control, and responsibilities, as follows:

> The process for conducting the assessment and using the result of the assessment in plant decision making should be proceduralized. The procedures should denote responsibilities for conduct and use of the assessment, and should specify the plant functional organizations and personnel involved, including, as appropriate, operations, engineering, and risk assessment (PSA) personnel. The procedures should denote responsibilities and process for conducting the assessment for cases when the plant configuration is not covered by the normal assessment tool.

Plants choosing to adopt LCO 3.0.4.b should ensure that plant procedures in place to implement 10 CFR 50.65(a)(4) address the situation where entering a MODE or other specified condition in the Applicability is contemplated with plant equipment not OPERABLE. Section 11.3.8 of NUMARC 93-01 discusses the need to treat plant MODE changes as an emergent condition that may affect a previously performed risk assessment, and would require re-performance of the assessment. Adoption of LCO 3.0.4.b would result in this consideration applying to assessments for planned activities, as well as emergent conditions.

1. The procedures should state that the risk assessment (and risk management actions) will consider the impact of being in the plant MODE or other specified condition in the Applicability to be entered, for the expected duration, considering the plant equipment configuration at the time of the MODE change.

2. The guidance of NUMARC 93-01, Section 11, and Appendix E (addressing PSA quality) should be followed in assessing and managing the risk resulting from the change in MODE or other specified condition in the Applicability.

3. The guidance of NUMARC 93-01 should be followed for situations where LCO 3.0.4.b is utilized.

4. The assessment should include consideration that there is a reasonable probability of completing restoration such that the requirements of the LCO would be met prior to the expiration of the ACTIONS Completion Times that would require exiting the Applicability.

LCO 3.0.4.b should not be used unless there is a reasonable probability of completing restoration such that the requirements of the LCO would be met prior to the expiration of the ACTIONS Completion Times that would require exiting the Applicability. The revised plant oversight process treats unplanned power changes as a factor that could lead to a finding under the significance determination process. Thus, the oversight process would provide a significant disincentive to entering the MODE of Applicability of an LCO, and moving up in power, when there was some likelihood that the MODE of applicability would have to be subsequently exited due to failure to restore the unavailable system or component to service within the Completion Time. The oversight process will also provide a significant disincentive to a MODE transition when the risk assessment indicates it is not appropriate.

In addition, as the unit goes up in MODE the complement of systems available to mitigate certain events is increased (e.g., for PWRs - availability of SGs for cooling, in addition to shutdown cooling, for BWRs - availability of HPCI and RCIC). In most cases, increasing in MODE from shutdown cooling results in a reduction of risk due to termination of shutdown cooling and the additional mitigation capability provided by steam driven systems at higher MODES. This is due to the added level of protection to prevent core damage on a loss of cooling, and the added ability to respond to a station blackout using steam driven systems. Thus in most cases, risk can be reduced by allowing entry into a MODE or other specified condition in the Applicability. For those cases where the risk of the MODE change may be greater, Notes prohibiting the use of LCO 3.0.4.b appear in the applicable Specifications.

Most plants have some pre-existing exceptions to the applicability of LCO 3.0.4 for certain systems or components. Most of these pre-existing exceptions are removed by the proposed change, and replaced with the risk-informed approach to LCO 3.0.4.b or the specific value and parameter allowances of LCO 3.0.4.c. LCO 3.0.4.c provides for NRC approved allowances for value, parameter, and other Specifications in the Standard Technical Specifications and plant specific Technical Specifications.

This change in LCO 3.0.4 philosophy requires a change in SR 3.0.4. If an LCO is not met, often the associated Surveillance Requirements are not met. If a Surveillance Requirement is not met prior to entering the MODE or specified condition in the Applicability, SR 3.0.4 prohibits entry into the MODES and other specified conditions in the Applicability. Under SR 3.0.1, when a Surveillance is not met, the LCO is declared not met and LCO 3.0.4 would also apply. Therefore, the LCO 3.0.4 allowances also need to appear in SR 3.0.4.

If it is discovered that a Surveillance has not been performed within its specified Frequency, SR 3.0.3 provides an allowance to defer declaring the affected equipment inoperable or an affected variable outside the specified limits. A delay period is provided to allow completion of the SR that has been missed before complying with Required Actions. Industry/TSTF Standard Technical Specification Change Traveler, TSTF-358, Revision 6, revised the delay period of SR 3.0.3 to allow a delay of 24 hours or up to the Surveillance interval, whichever is longer. But, a risk evaluation must be performed for any Surveillance that is delayed for more than 24 hours.

If a Surveillance is missed and the delay period allowed by SR 3.0.3 is used, LCO 3.0.4 would not apply because the affected equipment is OPERABLE. However, SR 3.0.4 requires Surveillances to be met within their specified Frequency prior to entry into a MODE or other specified condition in the Applicability. If SR 3.0.3 is applied to a missed Surveillance and a risk evaluation supports a delay beyond 24 hours, the existing SR 3.0.4 would only allow this delay to be applied in the MODE or other specified condition in the Applicability in which the plant is operating at the time of discovery that the Surveillance has been missed. While this provision does not prevent a shutdown, the existing SR 3.0.4 would prevent entry into a higher MODE of operation with a Surveillance that had not been performed within its specified Frequency.

To address this situation, SR 3.0.4 is modified to state that SR 3.0.4 prohibits entry into a MODE or other specified condition in the Applicability of an LCO unless the associated

Surveillances have been met within their specified Frequency, except as provided by SR 3.0.3. The Bases for SR 3.0.4 are modified to provide the flexibility for entry into higher MODES with a missed Surveillance since the equipment is still OPERABLE and the risk evaluation performed to satisfy SR 3.0.3 is valid for this situation. The Bases state, "SR 3.0.4 does not restrict changing MODES or other specified conditions of the Applicability when a Surveillance has not been performed within the specified Frequency, provided the requirement to declare the LCO not met has been delayed in accordance with SR 3.0.3."

Effect on Safety Analyses

Accident analyses presented in the UFSAR do not address the effects of the plant being in ACTIONS. The accident analyses assume that the necessary equipment is available and then, in most cases, assumes the single most limiting active failure occurs. It is this assumption that leads to limiting the length of Completion Times in order to minimize the length of time that the plant is not within the initial conditions of the accident analysis. This change does not affect the Completion Times. Therefore, this proposal would not affect the accident analyses.

Effect on Risk Informed Analysis

A quantitative, qualitative, or blended risk assessment must be performed to assess the risk impact of the MODE change, based on the specific plant configuration at that time, and the risk impacts must be managed in accordance with the assessment results. The Technical Specifications allow continued operation with equipment unavailable in a particular MODE or other specified Condition in the Applicability for the duration of the Completion Time. Since this is allowable, and since in general the risk impact in that particular MODE bounds the risk of transitioning into and through the applicable MODES or other specified conditions in the Applicability of the LCO, the use of the LCO 3.0.4.b allowance should be generally acceptable, as long as the risk is assessed and managed as stated above. However, there is a small subset of systems and components that have been determined to be more important to risk and use of the LCO 3.0.4.b allowance is prohibited. The LCOs governing these system and components contain Notes prohibiting the use of LCO 3.0.4.b by stating that LCO 3.0.4.b is not applicable.

The applicability of the LCO should be reviewed with respect to the actual plant configuration at that time. Entry into more than one LCO 3.0.4.b allowance at the same time would be assessed under the auspices of 10 CFR 50.65(a)(4) and consideration of risk management actions discussed in Regulatory Guide 1.182.

Owners Groups Qualitative Risk Assessment

Each of the Owners Groups has developed a Qualitative Risk Assessment to justify the relaxation and increased flexibility of the MODE restrictions. These reports are generic to the respective Owners Groups. Individual plants may perform plant specific assessments along with their respective Owners Groups reports to justify additional flexibility beyond the generic flexibility provided by this TSTF. These Owners Groups assessments are Attachments 1 – 4 of this document.

The Owners Group Qualitative Risk Assessments identified those systems and components that are more important from a risk standpoint during the transition up through the shutdown and startup MODES (PWR MODE 4 to 3 and MODE 3 to 2, and BWR MODE 3 to 2), and subsequently to power operation (MODE 1), than the risk in MODE 1 itself. The logic being, that if relying on ACTIONS is acceptable to remain in MODE 1 for the duration of the

Completion Time(s) with inoperable systems and components, it should also be acceptable to transition to MODE 1 with inoperable systems and components, as long as the risk associated with each MODE transition with the subject equipment inoperable is not greater than the risk in MODE 1 with the same inoperable equipment. Therefore, the scope of the PWR risk assessments focused on the transition from MODE 5 to 4, MODE 4 to 3, MODE 3 to 2, and MODE 2 to 1. The BWR assessment focused on the transition from MODE 4 to 3, MODE 3 to 2, and MODE 2 to 1. Other transitions in MODES or other specified conditions in the Applicability were not examined since LCO 3.0.4 and SR 3.0.4 were not applicable in those MODES and other specified conditions. The reports also considered unique events to the MODE of interest, such as LTOP protection, as described in the Owners Group report.

The configuration of various systems is relatively straightforward during a unit startup from Cold Shutdown (PWR Mode 5, BWR MODE 4) to MODE 1, versus the variability of systems due to maintenance in Cold Shutdown and Refueling (PWR MODES 5 and 6 and BWR MODES 4 and 5). For example, in PWR MODE 5, RCS loop(s) can be relied upon as a redundant method of decay heat removal in lieu of a residual heat removal loop. While some of the Owners Group Qualitative Risk Assessments considered some MODE transitions in Cold Shutdown and Refueling, they did not consider the various configurations that are allowed in these MODES, e.g., RCS Loops Filled, versus RCS Loops Not Filled. Additionally the risk assessments did not consider the transition from a defueled state to the Refueling MODE.

The Owners Group Qualitative Risk Assessments did not consider transitions in MODES or other specified conditions in the Applicability in the defueled state or Refueling and Cold Shutdown MODES. The plant-to-plant and outage-to-outage variability of system configurations in these MODES prohibits explicit analysis and it would not have been possible to generically determine if any Notes are needed to prohibit the use of LCO 3.0.4.b in these MODES or other specified conditions. However, expansion of the applicability of LCO 3.0.4 and SR 3.0.4 to those MODES and other specified conditions is considered acceptable without explicit analysis and identification of higher risk systems because the risk in these MODES and other specified conditions are adequately assessed and managed by 10CFR50.65 (a)(4) and NUMARC 93-01.

During the development of TSTF-359, the Owners Groups and the NRC met to resolve differences between the Qualitative Risk Assessments. The following list of Technical Specification systems were determined to be the “higher risk” systems to which LCO 3.0.4.b would not be applied:

NUREG-1430

System	MODE or Other Specified Condition in the Applicability to be Entered
Diesel Generators (Hydro-electric units for Oconee)	1, 2, 3, 4
ECCS Decay Heat Removal	4
Emergency Feedwater	1

NUREG-1431

System	MODE or Other Specified Condition in the Applicability to be Entered
Diesel Generators	1, 2, 3, 4
Auxiliary Feedwater	1, 2, 3, 4 if dependent upon AFW for startup
High Head Safety Injection	4
LTOP System	4

NUREG-1432

System	MODE or Other Specified Condition in the Applicability to be Entered
Diesel Generators	1, 2, 3, 4
Auxiliary Feedwater	1, 2, 3, 4
ECCS High Head Subsystem	4
LTOP System	4

NUREG-1433

System	MODE or Other Specified Condition in the Applicability to be Entered
Diesel Generators	1, 2, 3
High Pressure Coolant Injection (HPCI) System	1, 2
Reactor Core Isolation Cooling (RCIC) System	1, 2

NUREG-1434

System	MODE or Other Specified Condition in the Applicability to be Entered
Diesel Generators	1, 2, 3
High Pressure Core Spray (HPCS)	1, 2
Reactor Core Isolation Cooling (RCIC) System	1, 2

Determination of No Significant Hazards Considerations

A change is proposed to the Improved Technical Specifications NUREGs 1430 – 1434, LCO 3.0.4 and SR 3.0.4 to allow entry into a MODE or other specified condition in the Applicability while relying on ACTIONS after performance of a risk assessment. Most LCO 3.0.4 exceptions in individual Specifications would be eliminated. SR 3.0.4 is revised to reflect the LCO 3.0.4 allowance. LCO 3.0.4 and SR 3.0.4 have been expanded to apply in all MODES and Reviewer's Notes in LCO 3.0.4 and SR 3.0.4, and any plant-specific Notes resulting from the review required by the Reviewer's Notes, are eliminated.

In accordance with the criteria set forth in 10 CFR 50.92, the Industry has evaluated these proposed Improved Technical Specification changes and determined they do not represent a significant hazards consideration. The following is provided in support of this conclusion.

1. Does the change involve a significant increase in the probability or consequences of an accident previously evaluated?

The proposed change allows entry into a MODE while relying on ACTIONS. Being in an ACTION is not an initiator of any accident previously evaluated. Consequently, the probability of an accident previously evaluated is not significantly increased. The consequences of an accident while relying on ACTIONS as allowed by the proposed LCO 3.0.4 are no different than the consequences of an accident while relying on ACTIONS for other reasons, such as equipment inoperability. Therefore, the consequences of an accident previously evaluated are not significantly increased by this change. Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the change create the possibility of a new or different kind of accident from any accident previously evaluated?

The proposed change does not involve a physical alteration of the plant (no new or different type of equipment will be installed). Thus, this change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does this change involve a significant reduction in a margin of safety?

The proposed change allows entry into a MODE or other specified conditions in the Applicability while relying on ACTIONS. The Technical Specifications allow operation of the plant without a full complement of equipment. The risk associated with this allowance is managed by the imposition of ACTIONS and Completion Times. The net effect of ACTIONS and Completion Times on the margin of safety is not considered significant. The proposed change does not change the ACTIONS or Completion Times of the Technical Specifications. The proposed change allows the ACTIONS and Completion Times to be used in new circumstances. However, this use is predicated on an assessment which focuses on managing plant risk. In addition, most current allowances to utilize the ACTIONS and Completion Times which do not require risk assessment are eliminated. As a result, the net change to the margin of safety is insignificant. Therefore, this change does not involve a significant reduction in a margin of safety.

ATTACHMENTS

The Owners Groups Qualitative Risk Assessments are attached.

ATTACHMENT 1
BWROG
Technical Justification To Support Risk Informed Improvements to Technical Specification MODE Restraints for BWR Plants

GE-NE A13-00464-02 (Rev. 2)
DRF A13-00464
December 2000

GENERAL ELECTRIC COMPANY

TECHNICAL JUSTIFICATION TO SUPPORT RISK-INFORMED IMPROVEMENTS TO TECHNICAL SPECIFICATION MODE RESTRAINTS FOR BWR PLANTS

BWR Owners' Group
Risk-informed Technical Specification Committee

IMPORTANT NOTICE REGARDING CONTENTS OF THIS REPORT

Please Read Carefully

CONTENTS

APPENDICES

LIST OF TABLES

1. EXECUTIVE SUMMARY

This report addresses systems/components required to be available prior to changing Modes during plant startup in accordance with Initiative 3 of the BWR Owners' Group candidates for risk-informed improvements to plant Technical Specifications. Initiative 3 is related to revising Limiting Condition for Operation (LCO) 3.0.4 in the Improved Technical Specifications (ITS) to allow entry into a Mode or specified condition in the Applicability while relying on the associated ACTIONS, provided that there is a risk evaluation or ACTIONS to be entered permit continued operation in the Mode or other specified condition in the Applicability for an unlimited period of time. This report provides a generic pre-assessment risk evaluation to identify those systems/components that are important in BWR PSAs. For these systems/components, a configuration-specific risk evaluation should be performed before entry into a different Mode when an LCO is not met.

2. INTRODUCTION/BACKGROUND

During 1999, the BWR Owners' Group formed a Committee to identify risk-informed Technical Specifications (TS) improvements. This activity was part of a NRC and Industry Joint Owners' Group program to define and implement risk-informed Technical Specification changes. Seven initiatives were identified as potential candidates for risk-informed Technical Specifications improvements. The first of these initiatives concerns required actions when a TS LCO is not met. This has been analyzed and a risk-informed submittal is being made to NRC separately. The generic Model developed for Initiative 1 and insights obtained from other Industry full power PSAs serve as the basis for this report.

Initiative 3, the subject of this report, addresses increased flexibility in Mode restraints by allowing Mode changes to be made while relying on ACTION statements to satisfy the requirements of an LCO. LCO 3.0.4 states "When an LCO is not met, entry into a Mode or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the Mode or other specified condition in the Applicability for an unlimited period of time." The allowance to enter Modes or specified conditions in the Applicability while relying on ACTIONS is given because ACTIONS which permit continued operation of the unit for an unlimited period provide an acceptable level of safety for continued operation. This is without regard to the status of the unit before or after the Mode change.

The allowances of LCO 3.0.4 are based on NRC Generic Letter 87-09 which states, "Specification 3.0.4 unduly restricts facility operation when conformance with Action Requirements provides an acceptable level of safety for continued operation. For an LCO that has Action Requirements permitting continued operation for an unlimited period of time, entry into an operation Mode or other specified condition of operation should be permitted in accordance with the Action Requirements."

In the development of ITS, many improvements were made to LCO 3.0.4 including clarification of its applicability regarding normal shutdown and Required Action shutdowns, and Mode changes during Cold Shutdown and Refueling Operations. During ITS development, almost all the LCOs with Allowed Outage Times (AOTs) greater than or equal to 30 days, and many of the LCOs with AOTs greater than or equal to 7 days, were given individual LCO 3.0.4 exceptions. During many plant specific ITS conversions, individual plants provided justifications for other LCO 3.0.4 exceptions. These specific exceptions allow entry into a Mode or specified condition in the Applicability while relying on these ACTIONS.

ITS LCO 3.0.4 and SR 3.0.4 are still overly restrictive. The startup of a unit is frequently delayed due to the current restrictions of LCO 3.0.4. For example, a single maintenance activity that is almost complete can cause significant delays and changes in the previously well thought out plans for returning the unit to service. Allowing the unit to enter Mode of applicability for that specification would allow the work to be completed without creating error likely situations and avoid changes in other activities.

The purpose of this task is to identify risk-significant systems during various Modes of plant operation. For systems that are risk-significant for operation in Modes 1, 2 and 3 certain restrictions will be retained even after relaxation of TS3.0.4.

3. TECHNICAL APPROACH

Risk-significant systems during various Modes of plant operation can be identified by a combination of specific PSA studies and risk insights from Industry PSAs. Systems which are risk-significant during shutdown Mode 3 are identified by performing sensitivity studies using the generic BWR Mode 3 PSA Model developed for addressing Initiative 1 (Reference 1). For the BWR plant types not specifically modeled by the above PSA model, the above PSA results were augmented by insights from other Industry PSAs. For low power operation (Mode 2) and full power operation (Mode 1), risk-significant systems are identified based on risk insights from Industry PSAs and the generic BWR risk model previously discussed.

Risk Achievement Worth (RAW) is used to identify the importance of a particular system or basic event in the PSA. RAW of a system identifies the factor of increase over the base case Core Damage Frequency (CDF) when the system is unavailable with 100% certainty. The RAW values are obtained and studied to find out the relevance of the basic event (and the affected systems) to the core damage event.

LCO 3.0.1 or individual LCOs prohibit loss of safety function (two trains out-of-service) even with LCO 3.0.4 relaxed, therefore, common mode failure conditions are prevented.

4. ANALYSIS RESULTS

Generic lists of Risk-Significant BWR systems/components are provided in Tables 1 through 3. These Tables represent those systems/components that are Risk-Significant in any one of the operating Modes (Modes 1, 2, or 3). The Risk-Significant systems/components listed in these Tables would require a risk evaluation to determine the acceptability for changes in Modes or other specified conditions in the Applicability when an LCO is not met. Requirements of LCO 3.0.4 are not applicable for Modes 4 and 5. However, list of important systems in Mode 4 are also provided solely for the purposes of understanding the differences in the various modes and does not present Mode restraints while moving from Mode 5 to Mode 4.

Because the systems in the following tables have been identified based on generic models, individual plants may refine the list of risk significant systems for their plant as appropriate using plant-specific analysis.

Table 1

List of Risk-Significant BWR Systems/Components During Full Power (Mode 1)

- Reactor Protection System (RPS)
- High Pressure Coolant Injection (HPCI) System – BWR 3 and 4 plants
- High Pressure Core Spray (HPCS) – BWR 5 and 6 plants
- Reactor Core Isolation Cooling (RCIC) System - BWR 3, 4, 5 and 6 plants
- Isolation Condenser - BWR 2 plants
- Emergency/Shutdown AC Power
- Diesel Generators
- Hardened Wetwell Vent System - BWR 2, 3, and 4 plants with Mark I Containment
- Vital DC Bus Power
- Service Water System (Systems that provide cooling to ECCS components and rooms and the RHR System)

Table 2

List of Risk-Significant BWR Systems/Components During Low Power (Mode 2)

- Reactor Protection System
- High Pressure Coolant Injection System – BWR 3 and 4 plants
- High Pressure Core Spray – BWR 5 and 6 plants
- Reactor Core Isolation Cooling System - BWR 3, 4, 5 and 6 plants
- Isolation Condenser - BWR 2 plants
- Emergency/Shutdown AC Power
- Diesel Generators
- Hardened Wetwell Vent System - BWR 2, 3, and 4 plants with Mark I Containment
- Vital DC Bus Power
- Service Water System (Systems that provide cooling to ECCS components and rooms and the RHR System)

Table 3

List of Risk-Significant BWR Systems/Components During Shutdown (Mode 3)

- Emergency/Shutdown AC Power
- Diesel Generators
- Hardened Wetwell Vent System - BWR 2, 3, and 4 plants with Mark I Containment
- Vital DC Bus Power
- Service Water System (Systems that provide cooling to ECCS components and rooms and the RHR System)

Table 4

List of Important BWR Systems/Components During Shutdown (Mode 4)

- Emergency/Shutdown AC Power
- Diesel Generators
- Vital DC Bus Power
- Service Water System (Systems that provide cooling to ECCS components and rooms and the RHR System)
- Residual Heat Removal System

5. CONCLUSION

Based on a combination of PSA results and engineering judgment, a number of risk significant systems have been identified. It is concluded that the Technical Specification paragraph LCO 3.0.4 requirements can be relaxed to permit Mode changes for the remaining systems. For the risk-significant systems it is recommended that Mode change be permitted only following a risk assessment by the licensee. It is expected that the risk assessments would be similar to those needed to support the paragraph (a)(4) of 10 CFR 50.65 Maintenance Rule.

6. REFERENCES

6.1 GE-NE A13-00464, "Technical Justification to Support Risk Informed Modification to selected Required Action end States for BWR Plants", BWR Owners' Group Risk Informed Technical Specification Committee (to be published December 2000).

Appendix A

Table A-1

PARTICIPATING UTILITIES

Utility	Plant	BWR Type	Containment Type
Alliant Utilities Inc	Duane Arnold	4	I
AmerGen-CPS	Clinton	6	III
Carolina Power & Light	Brunswick 1 & 2	4	I
ComEd	Dresden 2 & 3 Quad Cities 1 & 2 LaSalle 1 & 2	3 3 5	I I II
Detroit Edison	Fermi 2	4	I
Energy Northwest	Columbia Generating Station	5	II
Entergy Nuclear Generating Co.	Pilgrim	3	I
Entergy Operations Inc.	River Bend Grand Gulf	6 6	III III
FirstEnergy	Perry 1	6	III
GPU Nuclear	Oyster Creek	2	I
Nebraska Public Power District	Cooper	4	I
New York Power Authority	Fitzpatrick	4	I
Niagara Mohawk Power Corp.	Nine Mile Point 1 Nine Mile Point 2	2 5	I II
Northern States Power	Monticello	3	I
PECO Energy	Peach Bottom 2 & 3 Limerick 1 & 2	4 4	I II
PPL Corp.	Susquehanna 1 & 2	4	II
Public Service Electric & Gas	Hope Creek	4	I
Southern Company Nuclear	Hatch 1 & 2	4	I
Tennessee Valley Authority	Browns Ferry 2 & 3	4	I
Vermont Yankee Nuclear Power	Vermont Yankee	4	I

ATTACHMENT 2
BWOG
Qualitative Risk Assessment for Increased Flexibility in MODE Restraints

BAW-2383

FRAMATOME
TECHNOLOGIES

B&W Owners Group
Qualitative Risk Assessment
for
Increased Flexibility in
MODE Restraints

October 1, 2001

TALE OF CONTENTS

PAGE

ACRONYMS AND ABBREVIATIONS

ADV	Atmospheric Dump Valve
ATWS	Anticipated Transient Without Scram
B&W	Babcock & Wilcox
BWR	Boiling Water Reactor
CEOG	Combustion Engineering Owners Group
CF	Core Flood
CRD	Control Rod Drive
DHR	Decay Heat Removal
EDG	Emergency Diesel Generator
EFW	Emergency Feedwater
HPI	High Pressure Injection
LCO	Limiting Condition for Operation
LOCA	Loss of Coolant Accident
LPI	Low Pressure Injection
LTOP	Low Temperature Overpressure Protection
MFW	Main Feedwater
MFWI	Main Feedwater Isolation
MSLI	Main Steam Line Isolation
NRC	Nuclear Regulatory Commission
PORV	Pilot Operated Relief Valve
PRA	Probabilistic Risk Assessment
P-S HT	Primary-to-Secondary Heat Transfer
PWR	Pressurized Water Reactor
PZR	Pressurizer
RBS	Reactor Building Spray
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RHR	Residual Heat Removal
RITS	Risk-Informed Technical Specification
RPS	Reactor Protection System
RV	Reactor Vessel
SG	Steam Generator
STS	Standard Technical Specifications
TBV	Turbine Bypass Valve
TSTF	Technical Specification Task Force

1.0 OBJECTIVE

The objective of this evaluation is to perform a qualitative risk assessment that identifies those plant systems deemed to be more important during startup and return to power than when in Mode 1.

2.0 BACKGROUND

Initiative 3 of the industry's Risk-Informed Technical Specification (RITS) Program addresses a global change to Reference 1, Standard Technical Specifications (STS), that will allow Mode changes to be made while relying on Action statements to satisfy the requirements of the Limiting Conditions for Operation (LCO). Currently, LCO 3.0.4 states "When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified conditions in the Applicability for an unlimited period of time." This restrictive requirement can delay the startup of a plant and in many situations it is overly restrictive. A nearly completed maintenance activity can delay a mode change and adversely impact a utility's plan for startup and return to power operation. A mode change is prohibited by STS, except as noted above, with certain equipment inoperable even though once in the mode of interest or at-power the plant may be able to operate for a limited period with the same equipment inoperable. This proposed change to STS LCO 3.0.4 will allow a plant to change modes with equipment inoperable consistent with the applicability of that mode.

The industry developed a Technical Specification Task Force (TSTF) STS Change Traveler (Reference 2) for this proposed change and provided it to the NRC for review and approval. The Traveler addressed the impact of this change on risk in a qualitative manner. As stated in the Traveler:

> *"A qualitative review of initiating event frequencies, considering lower MODE (2, 3, or 4 for PWRs, 2 or 3 for BWRs) accident mitigation features and the activities associated with the lower MODES was performed and the review indicates that this proposed change is reasonable and acceptable. Based on the review, systems/components were identified that would be more important or less important in non-MODE 1 operation based on initiating event. The review identified a small number of systems/components in which, based on an increased potential for a particular initiating event in the lower MODES, entry into a MODE of Applicability would potentially have a greater impact in MODES 2-4 than they would in MODE 1."*

The NRC provided the following comment from their review:

> *"The industry should provide the 'qualitative review,' mentioned under 'Risk Discussion' in the submittal, for the staff's review. In addition, a systematic investigation of likely changes in Modes or other specified conditions of operation and a 'feeling' for the associated risks could provide useful information to support an implementation approach for the proposed change. For example, such investigation may show that no detailed*

PRA models are needed to compare risks, including risks associated with 'transition' modes of operation."

The "qualitative review" was based on the CEOG's work with the PRA model for the San Onofre Nuclear Generating Station. Its applicability to plants for the other Owners Groups is not specified or discussed in the Traveler. To resolve this issue, the industry agreed to provide the NRC the requested "qualitative review" for each Owners Group.

3.0 APPROACH

The qualitative approach used is to identify the specific equipment that is required to be available prior to specific mode transitions. In this assessment, consideration is given to events that are unique to a specific mode or that have an increased probability of occurrence in a specific mode, and the availability of required mitigation systems. The basis for this assessment is a qualitative comparison of risk associated with lower mode operation to at-power operation in Mode 1. The risk from at-power operation is well understood, and generally associated with the highest level of plant risk, therefore, operation in the lower modes with equipment available should not be more limiting than operation in Mode 1 unless:

- there are unique events to the mode of interest,
- the typical events in the mode of interest have an increased probability of occurrence, or
- the mode of interest has a reduced mitigation system capability.

For this assessment, it is necessary to understand the key plant changes that occur in each mode in order to identify initiating events that can occur and systems available to detect and mitigate those events.

The following mode changes are considered:

- Mode 6 to 5
- Mode 5 to 4
- Mode 4 to 3
- Mode 3 to 2
- Mode 2 to 1

3.1 Key Parameters and Systems

This qualitative approach, which only considers mode changes when returning to power, requires an understanding of relevant key plant conditions during each mode. These conditions include important reactor coolant system (RCS) parameters and the status of mitigation systems. This information is provided in Tables 1 and 2.

Table 1: Key Plant Parameters By STS Mode

Table 1 provides key RCS parameter information, including STS requirements and expected operational conditions. In order to provide some indication of integrated plant conditions, Table 1 also includes SG pressure.

Table 2: Key System Status By STS Mode

Table 2 provides the status of the key systems for the different modes. This includes the availability of event mitigation systems and key normal operating systems.

3.2 Key Activities in Progress by Mode

The following lists provide a summary of relevant typical key activities that occur when returning to power. The lists, configured by mode, are based on a typical B&W plant. To facilitate understanding of the information in the lists, an attempt has been made to list activities in an "idealized" chronological order assuming startup following refueling.

Mode 6

- RCS cooling by Decay Heat Removal (DHR) system (RCS temperature ~100°F to ~140°F)
- Install RV head
- Implement Low Temperature Overpressure Protection (LTOP) measures (required when all RV head closure bolts fully tensioned)
- Tension RV head closure bolts
- Transition to Mode 5 when all RV head closure bolts fully tensioned

Mode 5

- RCS cooling by DHR
- Install pressurizer (PZR) safeties and manways (could occur in Mode 6, but cannot proceed in Mode 5 until accomplished)
- RCS fill and vent (Reactor Coolant Pump (RCP) seals vented; normal seal injection not yet established)
- Establish RCS makeup and letdown
- Establish PZR bubble
- Startup circulating water and condensate systems; align main steam system for heatup, including turbine bypass valves (TBVs) and atmospheric dump valves (ADVs)
- Prepare steam generators (SGs) for plant heatup
- Establish containment integrity
- Close reactor trip breakers and withdraw one or more safety banks
- Maintain LTOP measures (Mode 5 and lower end of Mode 4)
- Lower SG levels
- Start one makeup pump and place RCP seals in service
- Align EFW to available status
- Start two RCPs to initiate heatup (some plants may start three RCPs)
- Secure DHR and establish low pressure injection (LPI) system in standby
- Place Reactor Building Spray (RBS) in standby
- Increase RCS temperature > 200°F (transition to Mode 4 occurs when RCS temperature ≥ 200°F)

Mode 4

- Maintain RCS pressure in accordance with applicable curves
- Start additional RCP (if only two started previously)

- RCS heatup controlled by turbine bypass valves
- Secure from LTOP measures (when RCS T_{cold} > [plant specific temperature])
- Align high pressure injection (HPI) system to standby
- Increase RCS temperature to > 330°F (transition to Mode 3 occurs when RCS ≥ 330°F)

Mode 3
- Align main feedwater (MFW) and start MFW pump
- Align core flooding (CF) system to standby
- Align systems controlled by EFIC (or appropriate Secondary Plant Protection System(s)) to standby (includes EFW, Main Steam Line Isolation (MSLI) and MFW Isolation (MFWI))
- Start fourth RCP when RCS temperature > low temperature interlock
- Insert control rods and remove shutdown bypass from all RPS channels (involves deenergizing reactor trip breakers)
- Reclose reactor trip breakers and withdraw required rod banks (safety banks)
- Withdraw regulating rod banks and achieve criticality (transition to Mode 2))

Mode 2
- Increase reactor power
- Transition to Mode 1 when reactor power > 5%

Mode 1
- Increase reactor power
- Bring turbine on-line
- Escalate power (start second MFW pump as appropriate)

3.3 Initiating Events

Table 3 provides a summary of the initiating events by mode. The following discusses the applicability of each initiating event in each mode.

Large LOCAs: Large LOCAs are due to RCS pipe breaks. These are most likely when the RCS is at operating pressure, which occurs in Modes 1, 2, and 3. The frequency of occurrence is expected to be the same for each mode.

Medium LOCAs: Medium LOCAs are due to RCS pipe breaks. These are most likely when the RCS is at operating pressure, which occurs in Modes 1, 2, and 3. The frequency of occurrence is expected to be the same for each mode.

Small LOCAs/Loss of Inventory: Small LOCAs are due to RCS pipe breaks, stuck open safety valves or stuck open power operated relief valve (PORV), random failures of RCP seals, or mis-aligned systems leading to loss of inventory. Pipe breaks are most likely when the RCS is at operating pressure, which occurs in Modes 1, 2, and 3. Stuck open safety valves or PORV can occur as a result of transient events that lead to increased RCS pressures, such as total loss of main feedwater and turbine trip. The turbine operates only in Mode 1 and other transient events will not challenge these valves at the expected low decay heat levels. Random failures of RCP seals are also most likely when the RCS is at operating pressure and temperature, which occurs primarily in Modes 1, 2, and 3. Mis-alignment issues, also referred to as loss of inventory events, occur most frequently in the upper end of Mode 5 when RCS cooling is transitioned from the DHR to the SGs.

Contributors to small LOCAs by mode:

- Mode 1: RCS pipe breaks, stuck open safety valves or PORV, random failures of RCP seals
- Mode 2: RCS pipe breaks, random failures of RCP seals
- Mode 3: RCS pipe breaks, random failures of RCP seals
- Mode 4: Mis-alignment issues due to RCS/ DHR valve realignment
- Mode 5: Mis-alignment issues due to switch from DHR cooling to SG cooling and RCS/ DHR valve realignment

The frequency of a small LOCA is expected to be lower in Modes 2 and 3, than in Mode 1 since consequential LOCAs are not expected to occur in Modes 2 and 3. The frequency of a loss of inventory event (mis-alignment issue) in Mode 4 and 5 has been seen to be a significant contributor to plant risk.

<u>RCP Seal LOCAs (loss of seal cooling):</u> RCP seal LOCAs resulting from loss of seal cooling due to complete failure of component cooling water or service water are most likely when the RCS temperature and pressure is high, which occurs in Mode 1, 2, and 3. In the lower modes, the RCS temperature is lower so the seals would not be subject to the high temperatures. In addition, the RCS pressure is significantly reduced in the lower operating modes.

<u>Transients Leading to Inadequate Primary-to-Secondary Heat Transfer (P-S HT):</u> These transients generally include such events as loss of MFW and turbine trip. The turbine is only operating in Mode 1. For other transients in this category, initiating event frequencies for Modes 2, 3 and 4 would be no greater than those for Mode 1.

<u>Loss of Decay Heat Removal:</u> Loss of decay heat removal is applicable to Modes 2 through 6. Decay heat is being removed by the MFW/condensate systems in Modes 2, 3, 4 and the upper part of Mode 5. DHR by the DHR system is in effect in Mode 5 and 6. DHR during mid-loop operations occurs in Mode 5. Due to low RCS level during mid-loop operations, increased frequency of loss of the DHR system due to DHR pump suction vortexing is a concern. Transition from the DHR system to P-S HT can lead to increased frequency of loss of DHR due to inappropriate isolation of DHR system piping before P-S HT is established.

<u>Loss of Offsite Power:</u> This event is applicable to all modes of operation. If work is ongoing in the switchyard, there is an increased probability of a loss of offsite power, otherwise the event frequency is the same in each mode. Typically, work in the switchyard occurs in the lower modes and not in Mode 1.

<u>Steam Generator Tube Ruptures:</u> Steam generator tube ruptures are of concern when there is a high pressure difference across the steam generator tubes. This occurs when the RCS is at a high pressure and the secondary side is at normal operating pressure or lower. This event is of interest

in Modes 1, 2, 3, and the upper end of Mode 4. There is no significant difference in event frequency between these modes.

Secondary Side Breaks: Secondary side breaks are of concern when the secondary side is at pressure, which is in Modes 1, 2, 3, and 4. There is no significant difference in event frequency between these modes.

Cold Overpressurization: Cold overpressurization[1] (designated low temperature overpressure (LTOP) for B&W plants) is of greatest interest when the RCS is water solid (B&W-designed plants do not operate in this mode). For B&W-designed plants cold overpressurization, i.e., LTOP, measures are delineated when T_{cold} is ≤ [plant specific temperature]. The event frequency for such cold overpressurization events is deemed insignificant. In response to various NRC generic letters, most B&W plants implemented an LTOP system based on a dual setpoint PORV. In addition, administrative controls were implemented to provide the operator a 10-minute mitigation response time if an LTOP event was to occur and the PORV failed (Reference 4). This 10-minute time response is possible largely because B&W plants do not operate in a water solid state, the condition where low temperature overpressure is most probable.

ATWS: The ATWS event is only of concern when the reactor is at power. In Modes 3-6 the reactor is at 0% power with most or all control rods inserted; therefore, ATWS is not possible. In Mode 2 the initial power level is less than 5%, and the high RCS pressures associated with an ATWS event will not occur. Therefore, this event is of primary interest in Mode 1.

Rod Withdrawal: Rod withdrawal events can occur anytime the rods are inserted into the core and the reactor trip breakers are closed. This situation can occur in Modes 1, 2, 3, 4 and 5. Rod withdrawal event frequencies for all Modes are considered to be no greater than those associated with Modes 1 and 2.

Boron Dilution: The boron dilution event is of interest in all modes of operation and results primarily from lower boron concentration makeup being returned to the RCS related to malfunctions of the makeup system. Criticality caused by boron dilution events during lower mode operations does not appear to be a significant contributor to PWR risk. Such events that could occur during shutdown were analyzed by NSAC-183 (Reference 5). An historical data search associated with this analysis found no occurrence of a boron dilution initiated reactivity excursion that caused inadvertent criticality, a necessary precursor to core damage. The analysis included both gradual and rapid boron dilution events. Based on this, lower mode boron dilution risk is considered to be no more than that associated with Mode 1 and 2.

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1 The NRC initiated with Generic Issue (GI) 94, "Additional Low-Temperature Overpressure Protection for Light-Water Reactors," Pursuant to 10 CFR 50.54(f), an evaluation of the need for additional LTOP protection. A regulatory analysis for GI 94 was prepared based on the results reported in NUREG-1326 (Reference 3). NUREG-1326 indicated that B&W plants do not operate in a water solid state and that no low temperature overpressure events have occurred at B&W plants; therefore, B&W plants were excluded from the analysis. It is worth noting that NUREG-1326 estimates, for non-B&W-designed PWRs, a frequency of core damage due to a through-wall crack (or vessel failure) to be $6x10^{-16}$/hour for a PWR in RHR with a bubble in the PZR. If B&W plants had been analyzed and the 10-minute operator response period invoked, this frequency would have been reduced, most likely to a small enough fraction as to have no real meaning.

3.4 Key Events

The following discussion addresses key events and plant perturbations that could lead to a higher risk level in the lower modes of plant operation compared to the risk level for at-power operation. This discussion includes, where relevant, reasons why included plant perturbations will not increase initiating event frequencies.

Mode 5

The initiating events of interest in Mode 5 are loss of inventory, loss of DHR, loss of offsite power, boron dilution, rod withdrawal and RCS low temperature overpressure. The key activities in this mode address maintaining DHR during mid-loop operations and during transition from DHR system cooling to P-S HT, and prevention of RCS inventory loss due to inadvertent draindown. Hence, the events of concern in Mode 5 are loss of DHR and RCS inventory loss.

For loss of DHR, higher frequencies occur during mid-loop operations (low RCS level induced vortex issue) and transition to P-S HT (inappropriate DHR system isolation during RCS pressure increase to start RCPs). Regarding the loss of inventory event (due to valve mis-alignments), it has been shown to contribute significantly to shutdown risk. Because of these considerations, it is important to have the DHR[2] system available to provide core cooling and RCS makeup when entering Mode 5. Once transition has been made to P-S HT, there needs to be a SG feed source and steam relief path. SG feed during plant startup in the lower modes is available from multiple separate condensate system trains (some plants also have additional SG feed systems available). ADVs are considered to be no more important in this Mode than in Mode 1.

Other than these areas of concern, there are no significant perturbations that lead to increased event frequencies. While low temperature overpressure may be a concern during a plant perturbation, adequate operator response time exists to respond to such upsets, even if the overpressure devices fail. This is because of administrative controls placed on makeup system availability and PZR level, and because B&W designed plants do not operate in a water solid mode. LTOP restrictions are implemented in Mode 4 during cooldown when cold leg temperature decreases below a certain value; these restrictions remain in effect as long as cold leg temperature is below this value. LTOP restrictions prohibit operation of the HPI system.

Mode 4

The initiating events of interest in Mode 4 are loss of inventory, loss of DHR, loss of offsite power, boron dilution, rod withdrawal, RCS low temperature overpressure and secondary side breaks. The key activities in Mode 4 involve increasing RCS temperature and preventing RCS inventory loss due to inadvertent draindown. The loss of inventory events have been shown to contribute significantly to risk during shutdown operations. To reduce this risk, it is important to ensure the DHR[2] (LPI) system is available to supply coolant for inventory control. SGs are fed

[2] DHR and Low Pressure Injection (LPI) are essentially the same systems. When aligned as DHR, the system provides core cooling via heat exchangers to the plant's ultimate heat sink. When aligned as LPI, the system adds inventory to the RCS. Having DHR available means one train is operable per STS: one train is operable as an Emergency Core Cooling System train, if during DHR operations it can be manually realigned to the LPI mode.

by multiple separate condensate systems (some plants also have additional SG feed systems available). ADVs are considered to be no more important in this Mode than in Mode 1. This assessment assumes transition of core cooling from the DHR system to the SGs occurs in Mode 5. However, depending upon the length of the outage, it can also occur in Mode 4. For this reason, DHR[2] should be available prior to SG operations.

Other than these areas of concern, there are no significant perturbations that lead to increased event frequencies. While low temperature overpressure may be a concern during a plant perturbation, adequate operator response time exists to respond to such upsets, even if the overpressure devices fail. This is because of administrative controls placed on makeup system availability and PZR level, and because B&W-designed plants do not operate in a water solid mode. LTOP restrictions are implemented in Mode 4 during cooldown when cold leg temperature decreases below a certain value; these restrictions remain in effect as long as cold leg temperature is below this value. LTOP restrictions prohibit operation of the HPI system.

<u>Mode 3</u>
The initiating events of interest in Mode 3 are loss of coolant events, loss of DHR, loss of offsite power, boron dilution, rod withdrawal events, SG tube rupture and secondary side breaks. The key activities in Mode 3 involve increasing RCS temperature and pressure. Event risks are less than those associated with at-power conditions due to the lower decay heat levels associated with a plant shutdown. Initiating event frequencies for LOCAs and secondary side breaks are considered to be less than at-power because RCS and SG pressures are at operating values for only a part of the time the plant is in this mode. Initiating event frequencies for all other potential events are approximately equal to or less than at-power and the same mitigation systems are available. SGs are fed by multiple separate condensate and MFW systems (some plants also have additional SG feed systems available). ADVs are considered to be no more important in this Mode than in Mode 1.

<u>Mode 2</u>
The initiating events of interest in Mode 2 are the same as those for at-power operation with the exception of loss of main feedwater, turbine trip, rod withdrawal events and ATWS. The key activities in Mode 2 involve increasing the reactor power level to less than 5%. The probability of and risk from most events are the same or less than when at-power since the decay heat level will be lower. The initiating event frequencies for the potential events are approximately equal to or less then when at power, and the same mitigation systems are available. SGs are fed by multiple separate condensate and MFW systems (some plants also have additional SG feed systems available). ADVs are considered to be no more important in this Mode than in Mode 1.

<u>Mode 1</u>
The initiating events of interest in Mode 1 are provided on Table 3. The key activities in Mode 1 involve increasing reactor power level above 5% and bringing the turbine on-line. These activities can lead to an increase in frequency of loss of feedwater; hence, it is important to have EFW available when entering Mode 1.

Modes 5-1 Offsite Power Considerations
Operation in the lower modes offers a higher potential for loss of offsite power if there are activities ongoing in the switchyard as the plant is being brought up in modes. With deregulation it is speculated that the grid stability may be degraded with power plants offline. Since there may be an increased dependence on the emergency diesel generators (EDGs)[3] to supply the required electrical power when the plant is offline, the EDGs should be available prior to changing modes.

3.5 System Importance

When an initiating event occurs following a shutdown, the only energy that needs to be removed from the RCS is decay heat and any thermal energy stored in RCS components, i.e., as a result of partial RCS heatup prior to event initiation. This contrasts dramatically with full power assessment plant states that can require full power energy to be removed from the fuel without the benefit of normal heat removal processes. Because of this, at-power assessments can indicate very rapid RCS inventory depletion, RCS depressurization (or pressurization), RB pressurization and ultimately core degradation rates. On a relative basis, such rates of change are not possible with the assumed decay heat levels, and RCS pressure and temperatures associated with Modes 5, 4, 3, and 2. Therefore, available mitigation systems are expected, via operator action, to be able to mitigate initiating events associated with the various modes during a plant startup following an outage.

Based on the foregoing discussion and the information included in sections 3.1, 3.2, 3.3, and 3.4, a determination can be made of what STS required systems are more important during lower modes than during at-power conditions (i.e., Mode 1). The systems of interest are those delineated by STS as required in the lower modes during startup and return to power operations. STS may require these systems when in a particular mode or to transition to a higher mode. The results of this determination are presented in Table 4.

4.0 SUMMARY

The objective of this evaluation is to perform a qualitative risk assessment that focuses on STS delineated systems required to be operable prior to changing modes during a return to power from a plant shutdown. Performance of the qualitative assessment is based on a return to power operations following a plant shutdown. The results of this assessment are presented in terms of STS required systems that are more important during Modes 5, 4, 3, and 2 than during at-power operations, i.e., Mode 1.

Systems deemed more important represent limitations on plant mode changes during startup following a plant shutdown. These systems are shown in Table 4.

[3] Oconee uses two hydro-electric units rather than EDGs.

5.0 REFERENCES

1. NUREG-1430, "Standard Technical Specifications Babcock and Wilcox Plants, Revision 1," April 1995.

2. Industry/TSTF Standard Technical Specification Change Traveler, "Increased Flexibility in MODE Restraints," TSTF-359, Rev. 5.

3. NUREG/CR-6144, "Evaluation of Potential Severe Accidents During Low Power and Shutdown Operations at Surry, Unit 1, Volume 6 - Main Report," May 1995.

4. FTI Doc. No. 47-1172061-00 (BAW-2059), "Reactor Vessel Integrity - Pressure/Temperature Limits," VanScooter, et. al., November 1988.

5. NSAC-183, "Risk of PWR Inadvertent Criticality During Shutdown and Refueling," December 1992.

Table 1
Key Plant Parameters by STS Mode

Basis	Parameter	Mode 6 Refueling	Mode 5 Cold Shutdown	Mode 4 Hot Shutdown	Mode 3 Hot Standby	Mode 2 Startup	Mode 1 Power
STS Required[1]	RCS T_{ave} (°F)	NA	≤ 200	330 > T_{ave} > 200	≥ 330	NA	NA
	% Thermal PWR	NA	NA	NA	NA	≤5%	>5%
	Reactivity (k_{eff})	NA	< 0.99	< 0.99	< 0.99	≥ 0.99	≥ 0.99
Expected operational conditions[2]	RCS T_{ave} (°F)	≤ 140	> 140 to < 200	200 to < 330	330 to 532	549	582
	RCS Pressure (psig)	0	0 to ~250	~250 to ~750	~750 to ~2155	~2155	~2155
	SG Pressure (psig)	0	0 to vacuum	vacuum to ~85	~85 to ~885	~885	~885

Notes:
1. This information is from NUREG 1430, Standard Technical Specifications Babcock and Wilcox Plants, Revision 1, April 1995.
2. This information is from Crystal River 3 operating procedures.

Table 2
Key System Status by STS Mode

System	Mode 6 Refueling	Mode 5 Cold Shutdown	Mode 4 Hot Shutdown	Mode 3 Hot Standby	Mode 2 Startup	Mode 1 Power
RCS Makeup and Letdown	Out of service	Establish function	In service	In service	In service	In service
RCPs Running	None	2 or 3	3	3 or 4	4	4
Reactor Trip Breakers	Open	Closed	Closed	Closed	Closed	Closed
DHR	In service	In service or in standby	Standby	Standby	Standby	Standby
PZR	Open to containment	Vented to waste gas system or N_2 overpressure or bubble	Bubble	Bubble	Bubble	Bubble
RBS	Out of service	Place in standby	Standby	Standby	Standby	Standby
EFW	Out of service	Make available	Standby	Standby	Standby	Standby
HPI	Out of service	Establish limited availability based on LTOP measures	Standby	Standby	Standby	Standby
LPI	Out of service	Out of service or in standby	Standby	Standby	Standby	Standby
CF	Out of service	Out of service	Out of service	Standby	Standby	Standby
LTOP	Establish function	In service	In service	Not required	Not required	Not required
High Flux Trip Reset to Low Setpoint	NA	Yes	Yes	Yes	Yes[2]	No
Source Range	Not Required[1]	Two channels in service	Two channels in service	Two channels in service	Two channels in service	Not required
Intermediate Range	Not required	Two channels in service[3]	Two channels in service[3]	Two channels in service[3]	Two channels in service	Not required
Power Range	Not required	Not required	Not required	Required	Required	Required

Notes:

1. Not required by STS, however, two channels of source range instruments are in service at all times when there is fuel in the RV. They are either those associated with the normal nuclear instruments or temporarily installed refueling detectors. These instruments provide alarms for evacuation of the reactor building and containment isolation if source range counts exceed a predetermined value.
2. Some plants re-instate the high flux trip setpoint in mode 2 after exit from the reactor protection system shutdown bypass.
3. When any control rod drive (CRD) trip breaker is in the closed position and the CRD system is capable of rod withdrawal.

Table 3
Initiating Events by STS Mode

Initiating Event	Mode 6 Refueling	Mode 5 Cold Shutdown	Mode 4 Hot Shutdown	Mode 3 Hot Standby	Mode 2 Startup	Mode 1 Power
Large LOCA[1]				x	x	x
Medium LOCA[1]				x	x	x
Small LOCA/Loss of Inventory[2]	x	x	x	x	x	x
RCP Seal LOCAs (loss of seal cooling)[3]				x	x	x
Loss of Main Feedwater				x	x	x
Turbine Trip						x
Loss of DHR	x	x	x	x	x	
Loss of Offsite Power	x	x	x	x	x	x
Cold Overpressurization		x	x			
SG Tube Rupture[4]				x	x	x
Secondary Side Breaks[5]			x	x	x	x
ATWS						x
Boron Dilution	x	x	x	x	x	x
Rod Withdrawal		x	x	x	x	x

Notes:
1. Large and medium LOCAs are not considered in Modes 4 and 5 since the RCS pressure is much smaller than in Modes 1, 2, and 3.
2. Small LOCAs/Loss of Inventory in Modes 4, 5, and 6 are primarily due to alignment issues and open valves, not pipe breaks or random failures of RCP seals.
3. RCP seal LOCAs are not considered in Modes 4, 5, and 6 since the RCS pressure and temperature are much less than in Mode 3.
4. SGTRs are not considered in Modes 4, 5, and 6 since the ΔP across the tubes ($P_{RCS} - P_{SG}$) is much smaller than in Mode 3.
5. Secondary side breaks are not considered in Modes 5 and 6 since the secondary side pressure is much smaller than in Modes 3 and 4.

Table 4
Results of B&WOG Systems "More" Important Assessment

To Enter Plant Operating Mode	Systems More Important[1]
5	DHR EDG [hydro-electric units for Oconee]
4	DHR EDG [hydro-electric units for Oconee]
3	EDG [hydro-electric units for Oconee]
2	EDG [hydro-electric units for Oconee]
1	EFW[2] EDG [hydro-electric units for Oconee]

Notes:

1. Includes systems supporting the operation of the systems listed in this column.
2. In Modes 5, 4, 3 and 2, EFW is not as important because of the availability of other multiple separate systems to supply feedwater to the SGs. Other systems include multiple condensate and main feedwater systems (some plants also have additional SG feed systems available).

ATTACHMENT 3
CEOG
Qualitative Risk Assessment for Relaxation
of
MODE Entry Restraints

CEOG COMBUSTION ENGINEERING OWNERS GROUP

CE NPSD-1207, Rev 0

Qualitative Risk Assessment for Relaxation of Mode Entry Restraints

CEOG Task 1181

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CE NPSD-1207, Rev 0

Qualitative Risk Assessment for Relaxation of Mode Entry Restraints

CEOG Task 1181
Final Report

January 2001

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TABLE OF CONTENTS

1.0 OBJECTIVE

This report provides a qualitative risk assessment to identify the higher risk significant systems/ components as a function of plant operational modes for CEOG PWRs. Components identified as high risk significant in the target mode are to be exempted from the proposed relaxation to LCO 3.0.4. This effort supports the industry-wide risk-informed TSTF initiative to relax mode entry restraints (TSTF-359).

2.0 BACKGROUND

Initiative 3 of the industry's Risk-Informed Technical Specification (RITS) Program addresses a global change to the Standard Technical Specifications that will allow mode changes to be made while relying on action statements to satisfy the requirements of the LCO. Currently, LCO 3.0.4 states "When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified conditions in the Applicability for an unlimited period of time." This restrictive requirement can delay plant startup as the plant expends considerable resources to expeditiously resolve startup issues that are risk insignificant or low risk. For example, a nearly completed maintenance activity can delay a mode change and adversely impact a utility's plan for plant startup and return to power operation. To resolve this concern, the industry has proposed, a change to LCO 3.0.4 that will allow mode changes to occur with equipment inoperable by allowing the plant to enter the applicable LCO action statement for that mode.

This proposal is based on the premise that most AOTs were developed for Mode 1 and pose an acceptable plant risk for action statement entries initiated at, or occurring at lower modes. The AOTs are believed to be conservatively short when lower mode operational conditions are considered. To ensure the proposed relaxation is properly applied, systems/components that are judged more important to lower mode operation are exempted from the change. Individual plants may include these systems/components when incorporating this change provided the mode changes are subject to a robust risk-informed assessment.

The industry developed a TSTF-359 (Standard Technical Specification Change Traveler, Reference 1) for this proposed change and provided it to the NRC for review and approval. The Traveler addressed the impact of this change on risk in a qualitative manner. As stated in the Traveler:

> *"A qualitative review of initiating event frequencies, considering lower MODE (2, 3 or 4 for PWRs, 2 or 3 for BWRs) accident mitigation features and the activities associated with the lower MODES was performed and the review indicates that this proposed change is reasonable and acceptable. Based on the review, systems/components were identified that would be more important or less important in non-MODE 1 operation based on initiating event. The review identified a small number of systems/components in which, based on an increased potential for a particular initiating event in the lower MODES, entry into a MODE of Applicability would potentially have a greater impact in MODES 2-4 than they would in MODE 1."*

The NRC provided the following comment from their review:

> *"The industry should provide the "qualitative review," mentioned under "Risk Discussion" in the submittal, for the staff's review. In addition, a systematic investigation of likely changes*

in Modes or other specified conditions of operation and a "feeling" for the associated risks could provide useful information to support an implementation approach for the proposed change. For example, such investigation may show that no detailed PRA models are needed to compare risks, including risks associated with "transition" modes of operation."

This document summarizes the results of a qualitative review of contributors to mode dependent risks. The "qualitative review" was based on the CEOG's work with the PRA model for the San Onofre Nuclear Generating Station performed to support the CEOG Risk-Informed End State Assessment (CE-NPSD-1186, Reference 2).

3.0 APPROACH

A qualitative assessment is used to identify the specific systems/components that are required to be available prior to specific mode transitions. In this assessment, consideration is given to events that are unique to the specific mode being entered or that have an increased probability of occurrence in the mode being entered, and the availability of required mitigation systems. The basis for this assessment is a qualitative comparison of lower mode operations to operation in Mode 1. For situations where Mode 1 risk issues dominate the need for the system/component, the Mode 1 AOTs will be conservative when the event occurs in a lower mode. The qualitative insights are supported by supplemental information contained in the CEOG Risk-Informed End State Assessment Topical Report (Reference 2).

The risk associated with at-power operation is well understood. After decades of modeling PSA aspects of power operation, reviews of alternative mode risks have identified that, as the plant transitions from "at power" to "shutdown", the importance of most TS systems decreases. However, a few TS systems increase in importance. The increased importance of these systems arises as a result of:

- Events unique to the mode of interest,
- The typical events in the mode of interest have an increased probability of occurrence, or
- The mode of interest has a reduced mitigation system capability.

For this assessment, only mode changes associated with returning to power are under consideration. Therefore, it is necessary to identify those TS systems/components that are more important in the lower modes so that they may be highlighted for special treatment.

It is assumed as part of this assessment that the existing mode specific TS for all equipment provides adequate guidance to the plant staff with regard to the allowed outage time of a single component. Furthermore, the associated risks of entry into the Action Statement are limited and acceptable. Thus, entry into a TS action statement for a single component outage will be acceptable when such an entry is performed in a manner consistent with the TS and 10CFR50.65 (a)(4) (Reference 3).

<u>3.1 RCS Parameters and Status of Key Systems</u>

The qualitative approach to identifying the more important lower mode systems/components requires an understanding of the plant conditions when entering and exiting the different modes. This includes the status of plant parameters and availability of event mitigation systems/components. Table 1 provides a summary of key Reactor Coolant System (RCS) parameters for each mode for a typical CE designed PWR.

Table 2 provides the status of selected key systems for the different modes. The table shows the status or availability of RPS/ESFAS actuation and event mitigation systems, and several key normal operating systems. The table is not a comprehensive list of all plant operating systems. The list is illustrative only. Support systems necessary for the proper functioning of major systems are assumed to be available and operable.

3.2 Key Activities in Progress

The following provides a summary of the typical key activities that are in progress when returning to power for the mode transitions. This is based on a typical Combustion Engineering plant.

The following mode changes are considered:

- Mode 6 to 5
- Mode 5 to 4
- Mode 4 to 3
- Mode 3 to 2
- Mode 2 to 1

Modes 6-5

- RCS cooling by Shutdown Cooling System (SCS).
- Pressurizer safeties and manways installed.
- Low Temperature Overpressure Protection (LTOP) is in service.
- RCS charging and letdown in service.
- RCP seal injection (Sys. 80 plants only) in service.
- SG levels established and being maintained in the normal band.
- Fully tension reactor vessel head closure bolts (This establishes the transition from Mode 6 to Mode 5).

Modes 5-4

- RCS fill and vent completed (for some CE designed PWRs RCS can be water solid at some point in Mode 5).
- Pressurizer bubble established.
- Establish/enable Engineering Safety Features Actuation Signals (ESFAS).
- RCS temperatures being increased to ~ 330 °F (transition to Mode 4 occurs when RCS temperature exceeds 200 °F).
- RCS loops filled, with SG available as an operable heat sink (requires operable AFW and steam release path).
- Both Diesel Generators (DG) available and in standby.
- RCS pressure being maintained at ~ 340 psig.
- RCS cooling by Shutdown Cooling System (SDC secured as RCS heat up to above 200 °F and SG heat sink is established).
- LTOP in service (Mode 5 and lower end of Mode 4) LTOP operation varies among plants.
- Containment spray and coolers are verified available.

- RCS heatup being controlled by Turbine Bypass Control System or ADVs.

Mode 4-3

- Steam Generators (SGs) chemistry being adjusted in preparation for startup.
- SDC system is isolated.
- LTOP system not in effect.
- AFW being used to feed SGs (Note: plants with electric feedwater pumps or condensate pumps may use them for startup instead of AFW).
- RCS temperatures being increased from ~ 330 °F to ~ 557 °F with pump heat (transition to Mode 3 occurs when RCS temperature exceeds 350 °F, specific temperature range may vary among plants).
- RCS pressure being raised from ~ 340 psig to ~ 2235 psig.
- SIAS and MSIS auto reset.

Mode 3-2

- Remaining RCPs started when RCS is greater than about 525 °F (Mode 3).
- Reactor trip breakers are closed (Mode 3).
- Shutdown and control banks are withdrawn (Mode 3).
- Power is less than 5% (Mode 2).

Mode 2-1

- Transfer from AFW to MFW (note that some plants may already be on MFW depending on their approach to plant startup) (Mode 1).
- Increase power (Mode 1).
- Bring turbine on-line (Mode 1).

3.3 Initiating Events

Table 3 provides a summary of the initiating events by mode. The following discusses the applicability of each initiating event in each mode.

Large LOCAs: Large LOCAs are due to RCS pipe breaks. These are most likely when the RCS is at operating pressure which occurs in Modes 1, 2 and 3. The frequency of occurrence is expected to be the same for each mode.

Medium LOCAs: Medium LOCAs are due to RCS pipe breaks, stuck open safety relief valves or Power Operated Relief Valves (PORVs). These are most likely when the RCS is at operating pressure which occurs in Modes 1, 2 and 3. The frequency of occurrence is expected to be the same for each mode. Stuck open safety valves or PORVs can occur as a result of transient events which lead to increased RCS pressures, such as, total loss of main feedwater and turbine trip.

Small LOCAs: Small LOCAs are due to RCS pipe breaks, random failures of RCP seals, or mis-aligned systems. Pipe breaks are most likely when the RCS is at operating pressure which occurs in Modes 1, 2 and 3, and the frequency of the pipe break contribution to the initiating event frequency is expected to be the same for each of these modes. Random failures of RCP seals are also most likely when the RCS is at operating pressure and temperature which occurs primarily in Modes 1, 2 and 3. A successful response to breaks in the small break LOCA size range requires availability of steam generator heat removal.

Mis-alignment issues that can lead to LOCAs (also referred to as loss of inventory events) occur most frequently in the lower end of Mode 4 when the RCS cooling is switched between Shutdown Cooling heat removal via the SDC system and SG heat removal.

Contributors to small LOCAs by mode:

- Mode 1: RCS pipe breaks, random failures of RCP seals.
- Mode 2: RCS pipe breaks, random failures of RCP seals.
- Mode 3: RCS pipe breaks, random failures of RCP seals.
- Mode 4: Mis-alignment issues related to Shutdown Cooling System.
- Mode 5: Mis-alignment issues related to Shutdown Cooling System.

<u>RCP Seal LOCAs (loss of seal cooling, System 80 only):</u> RCP seal LOCAs due to random mechanical failure of seals are considered as small LOCA. Induced RCP seal LOCAs may arise resulting from loss of seal cooling due to complete failure of component cooling water or service water. Seal failure is most likely when the RCS temperature and pressure are high and the RCP is operating. This occurs in Mode 1, 2 and 3. In Modes 4, 5 and 6 the RCS temperature is sufficiently low that the seals would not be subject to thermal temperature challenges. In addition, the RCS pressure is significantly reduced in the lower operating modes, so the ability to mitigate the event is enhanced

<u>General Transients:</u> The general transients group includes loss of feedwater and turbine trip events. These events primarily occur when the reactor is at a power level greater than 5% in Mode 1. At power levels less than 5%, the main feedwater system may or may not be operating and the turbine is not operating.

<u>Loss of Decay Heat Removal:</u> Decay heat removal may be accomplished in Modes 2-5. Several means exist to remove decay heat. Two primary mechanisms for decay heat removal the SGs and the shutdown cooling system. Steam generators are used to remove decay heat using AFW and TBV's or ADVs in Modes 2 and 3, and the upper part of Mode 4. For some plants, MFW may support heat removal in theses modes as well. Shutdown Cooling decay heat removal is in effect in the lower part of Mode 4, and Modes 5 and 6. When entering Mode 5 from Mode 6 the RCS is depressurized and RCS loops may not be filled. Reduced inventory availability may lead to lower NPSH margin and an increased potential for loss of decay heat removal.

<u>Loss of Offsite Power:</u> This event is applicable to all modes of operation. If work is ongoing in the switchyard, there is an increased probability of a loss of offsite power event, otherwise the event frequency is the same in each mode. Typically, work in the switchyard occurs in the lower modes and not in Mode 1. At lower modes (Modes 4, 5 and 6) LOOP is particularly problematic as most plants are designed such that <u>all</u> heat removal mechanisms require electrical power.

<u>Steam Generator Tube Ruptures:</u> Steam generator tube ruptures are of concern when there is a high pressure difference across the steam generator tubes. This occurs when the RCS is at a high pressure and the secondary side is at normal operating pressure or lower. This event is of interest in Modes 1, 2, 3 and the upper end of Mode 4 prior to reducing the RCS pressure. There is no significant difference in event frequency between these modes.

Secondary Side Breaks: Secondary side breaks are of concern when the secondary side is at normal operating pressure which is in Modes 1, 2 and 3. There is no significant difference in event frequency between these modes. The impact of secondary side breaks in Mode 4 is reduced as the secondary temperature is typically less below 350 F (saturation pressure at 350 F is about 135 psia).

Cold Overpressurization: Cold overpressurization is of greatest interest when the RCS is water solid. This occurs during Mode 5 operation. For most plants, cold overpressurization is also of interest in Mode 4.

ATWS: The ATWS event is only of concern when the reactor is at power. In Modes 3 - 6 the reactor is at 0 power with the control rods inserted, therefore, ATWS is not possible. In Mode 2 the initial power level is less than 5%, and the high RCS pressure threat associated with an ATWS event will not occur, as the RCS has less stored energy than in Mode 1 and proportionally greater heat removal capacity. Therefore, this event is of primary interest in Mode 1.

Rod Withdrawal: Rod withdrawal events can only occur when the rods are in the core and the reactor trip breakers are closed. This situation can occur in Modes 1 - 3.

Boron Dilution: The boron dilution event is of interest in all modes of operation and results primarily from lower boron concentration makeup being returned to the RCS. This would likely be related to malfunctions of the CVCS or operator error.

3.4 Assessment of Mode Dependent Component Restrictions

Based on the previous information, the following assessments identify the key plant components, whose unavailability could lead to a higher risk level in the lower modes of plant operation This information is provided by plant mode.

Mode 5 Operation

The events of interest in Mode 5 are loss of inventory, loss of RCS heat removal, loss of offsite power, boron dilution and cold overpressurization. On initial entry into Mode 5 the RCS generally will be depressurized (loops may be filled or not filled). During midloop operation the potential for loss of decay heat removal is increased due to the reduced availability of NPSH margins for the SDC pumps. To reduce the risk from this event, the operators should be well trained on mid-loop operation and only one of the redundant trains of the Shutdown Cooling System should be operating at one time. Possible primary flow diversions due to valve realignments may result in inadvertent loss of coolant events. To minimize these risks, plant operation should be in accordance with the plant shutdown operations program plan. In this mode, the reactor vessel and RCS components are also susceptible to overpressurization failure due to loss of decay heat removal or spurious injection by HPSI. The cold overpressurization event is unique to Modes 5 and 4; it represents a risk not considered in the other modes. The LTOP system is designed to mitigate these challenges during low temperature operation.

Component Restrictions for entering Mode 5 using LCO 3.0.4 relaxation

Mode 5 risks are driven by loss of decay heat removal and, for water solid (or near solid conditions), spurious HPSI injection and unavailability of LTOP. Prior to entering Mode 5, both trains of the Shutdown Cooling System need to be available with one train in service, one EDG should be available (consistent with TS) , and the LTOP system is required to be in service.

Note that while HPSI is not required to be operable in Mode 5, shutdown practices typically recommend one train of HPSI be available to inject borated water into the RCS.

Mode 4 Operation

The events of interest in Mode 4 are loss of inventory, loss of decay heat removal, loss of offsite power, secondary side breaks, boron dilution, and cold overpressurization. The key activities in Mode 4 involve the switch, from Shutdown Cooling to SG heat removal and the increase in RCS temperature. During this switch the plant is susceptible to loss of RCS heat removal and loss of inventory events. The loss of inventory events due to Shutdown Cooling system mis-alignments, have been shown to contribute significantly to the risk of Mode 4 operation in shutdown PRA models. To reduce the risks from these two events it is important to ensure the appropriate mitigation systems are available. These include the AFW system to maintain heat removal and one HPSI Pump or the CVCS to supply coolant for inventory control. Low Temperature Overpressure Protection (LTOP) is also important in the lower end of Mode 4. The LTOP system is designed to mitigate excessive pressure at low temperature events.

Component Restrictions for entering Mode 4 using LCO 3.0.4 relaxation

In the low temperature end of Mode 4, LTOP is required to be in service. Many means exist to provide RCS heat removal in Mode 4. Standard operating guidance should be followed to ensure diverse and redundant heat removal paths are available. For shutdown cooling operation, entry into Mode 4 should not be made without availability of both trains of SDC or availability of two trains of AFW and support systems and steam relief paths. As a result of the possibility of reduced inventory in this mode and the potential for loss of inventory events during the mode 5 to 4 transition, the requirement for inventory control via availability of one train of HPSI (per LCO 3.5.3) should also be exempted from the LCO 3.0.4 relaxation. In the higher temperature end of Mode 4, use of the mode relaxation for AFW train inoperability should also be excluded.

Mode 3 Operation

The events of interest in Mode 3 are loss of coolant events, loss of decay heat removal, loss of offsite power, SG tube rupture, secondary side breaks and boron dilution. The key activities in Mode 3 involve the RCS temperature and pressure increase, and withdrawing the shutdown and control rods. The risk of from, most events are dependent on the core decay heat load. During startup, Mode 3 will have less risk than Mode 1 operation. This is likely since the decay heat level is lower during a startup from a lower mode than the decay heat level following a reactor trip. Also, initiating event frequencies are approximately equal to, or less than those in Mode 1, with most of the same mitigation capability. Unlike Mode 1, MFW may not be available in Mode 3. For most CE PWRs, in Mode 3 the plant is dependent on AFW for RCS heat removal, therefore, the availability of AFW is important. A degraded AFW system puts the plant into a more susceptible condition with regard to decay heat removal.

As in Mode 4, the ECCS technical specification only requires one train of HPSI for inventory control so long as the RCS pressure is below [1700 psia].

Component Restrictions for entering Mode 3 using the LCO 3.0.4 relaxation

A risk assessment prior to entering Mode 3 should ensure that adequate means exist to provide core/ RCS heat removal and inventory control. Prior to entering Mode 3, the AFW system and one train of the HPSI system are required to be available. This requirement also includes the associated support systems and associated steam relief paths required for the proper functioning of these systems. In addition, actuation signals to start the AFW system should be placed in service prior to switching RCS heat removal to the AFW system. As with Mode 4, the AFW system is of more risk importance in Mode 3 than in Mode 1. It is therefore recommended that without additional PSA assessments, the AFWS should be excluded from the LCO 3.0.4 relaxation. Furthermore, since inability to meet the HPSI system TS at lower RCS pressures will result in no HPSI injection capability Mode 3, it is recommended that this condition also be excluded from the LCO 3.0.4 relaxation.

As EDGs are important for providing emergency power to the required mitigating systems, the LCO 3.0.4 exemption is also extended to the plant EDGs.

<u>Mode 2 Operation</u>

The events of interest in Mode 2 are the same as those for at-power operation with the exception of loss of main feedwater (although loss of decay heat removal is applicable), turbine trip and ATWS. The key activities in Mode 2 involve increasing the reactor power level to less than 5%. The probability of, and risk from, events are the same or less than Mode 1. This is likely since the decay heat level is lower during a startup Mode 2, the initiating event frequencies for the potential events are approximately equal to or less than those in Mode 1, with both modes having the same mitigation systems available. In Mode 2 the plant may be dependent on AFW for RCS heat removal; therefore, the availability of AFW is important. A degraded AFW system puts the plant into a more susceptible condition with regard to decay heat removal.

Component Restrictions for entering Mode 2 using the LCO 3.0.4 relaxation

Prior to entering Mode 2, the AFW system is secured, but required to be available. This includes the associated support systems and actuation signals to start the AFW system. The AFW system is more risk significant in Mode 2 than in Mode 1. It is therefore recommended that without additional PSA assessments, the AFW system should be excluded from the LCO 3.0.4 relaxation. As EDGs are important for providing emergency power to the required mitigating systems, the LCO 3.0.4 exemption is also extended to the plant EDGs.

<u>Mode 1 Operation</u>

The events of interest in Mode 1 are provided on Table 3. The key activities in Mode 1 involve increasing the reactor power level to 100%, transferring from AFW to main feedwater (some plants may already be on MFW), and bringing the turbine on-line. These startup activities provide for an increased probability of loss of feedwater flow to the steam generators. During this phase of the startup, the plant is more dependent on AFW than when operating at steady-state conditions due to the increased potential for loss of feedwater or turbine trip. A degraded AFW system puts the plant into a more susceptible condition with regard to decay heat removal.

Component Restrictions for entering Mode 1 using the LCO 3.0.4 relaxation

Prior to entering Mode 1, the AFW system, associated support systems and actuation signals are required to be available. The AFW System provides decay heat removal capability for a wide range of plant upsets. It is therefore recommended that without additional PSA assessments, the AFWS should be excluded from the LCO 3.0.4 relaxation. As EDGs are important for providing emergency power to the required mitigating systems, the LCO 3.0.4 exemption is also extended to the plant EDGs.

Comments on EDG Unavailability

Operation in the lower modes offers a higher potential for loss of offsite power if there are activities ongoing in the switchyard. If such activities are in progress, then there is an increased plant dependence on the Emergency Diesel Generators (EDGs). Therefore, if there are activities ongoing in the switchyard, the risk assessments should consider the potential for increased loss of power events. While in any shutdown mode, standard plant practices for ensuring safe plant shutdown operation should be followed. The plant risk in shutdown modes will be managed consistent with the requirements of 10CFR50.65.

It should be noted that EDG restrictions discussed above are based on situations where the TS EDGs are the only source of emergency AC. Plants with alternate AC sources and/or plant cross-ties may have sufficient redundancy such that additional flexibility in relaxing mode restraints can be justified.

4.0 SUMMARY

An assessment of the components important to controlling risk in lower modes was performed. The results of this assessment identified several components which are not candidates for the proposed change and should be excluded from the LCO 3.0.4 relaxation. These components and their Mode limitations are identified in Table 4.

Note that components contained in Table 4 may be removed from the exclusionary list on a plant specific basis via use of RG 1.174. To secure this additional flexibility, a commitment to a pre-transition assessment will be required and the PSA methodology should be capable of estimating plant risks in Modes 4 and 5.

5.0 REFERENCES

1. Industry/TSTF Standard Technical Specification Change Traveler, "Increased Flexibility in MODE Restraints," TSTF-359, Revision 1.

2. CE-NPSD-1186, Revision 00, "Technical Justification for the Risk Informed Modification to Selected Required Action End States for CEOG PWRs," March 2000, Combustion Engineering, Inc.

3. 10CFR50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," July 10, 1996.

Table 1
Key Plant Parameters by Technical Specification Mode

Parameter	Mode 6	Mode 5	Mode 4	Mode 3	Mode 2	Mode 1
Average RCS Temperature	NA	≤ 200 °F	200 °F to 350 °F	≥ 350 °F	Normal Operating Temperature	Normal Operating Temperatures
Reactor Power Level	NA	NA	NA	NA	≤ 5%	> 5%
Reactivity Condition K_{eff}	NA	< 0.99	< 0.99	< 0.99	≥ 0.99	≥ 0.99
RCS Pressure	Atmospheric	Atmospheric	Min RCP NPSH to ~ 1500 psia	1500 psia to 2250 psia	~ 2250 psia	~ 2250 psia
Pressurizer Status	- open/vented to - closed/water solid	Closed/Water solid	Bubble	Bubble	Bubble	Bubble
Secondary Side Pressure	0 psig	0 psig	Operating pressure limited by RCS temperature	Normal Operating Pressure	Normal Operating Pressure	Normal Operating Pressure

Table 2
System Status by Technical Specification Mode

System	Mode 6	Mode 5	Mode 4	Mode 3	Mode 2	Mode 1
Charging and Letdown (CVCS)	Placed In Service before mode change	In service	In service	In service	In service	In service
Reactor Coolant Pumps	None running	As needed for plant heatup	As needed for plant heatup	All running	All running	All running
Shutdown Cooling System	In service	In service	In service or Isolated	Isolated	Isolated	Isolated
Auxiliary Feedwater	Out of service	Out of service	Aligned for startup	Aligned for startup or in standby	Aligned for startup or in standby	In standby
Low Pressure Safety Injection Pump	In Service*	In Service*	In Service or Standby	Standby	Standby	Standby
High Pressure Safety Injection Pump	Pull to lock (LTOP)	Pull to lock (LTOP)	Pull to lock (LTOP) Standby one train operable	Standby two trains operable above [1700 psia]	Standby two trains operable	Standby two trains operable
LTOP	Enabled	Enabled	Enabled (Below [275 °F])	Disabled	Disabled	Disabled
Log Power/Power Rate of change	Not required	Operable	Operable	Operable	Operable	Operable
RPS Matrix	Not required	Operable	Operable	Operable	Operable	Operable
RPS Trip Unit	Not required	Not required	Not required	Not required	Operable	Operable
ESFAS	Not required	Not required	Operable (Manual Actuation)	Operable	Operable	Operable
Emergency Diesel Generators	One EDG Operable	One EDG Operable	Operable (Two)	Operable (Two)	Operable (Two)	Operable (Two)

* To support SDC.

Table 3
Initiating Events by Technical Specification Mode

Initiating Event	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6
Large LOCA[1]	X	X	X			
Medium LOCA[1]	X	X	X			
Small LOCA/loss of inventory[2]	X	X	X	X	X	X
RCP Seal LOCAs (loss of seal cooling)[5]	X	X	X			
Loss of Main Feedwater	X					
Turbine Trip	X					
Loss of Decay Heat Removal[7]		X	X	X	X	X
Loss of Offsite Power	X	X	X	X	X	X
Cold Overpressurization				X	X	
SG Tube Rupture[3]	X	X	X			
Secondary Side Breaks[4]	X	X	X	X		
ATWS	X					
Boron Dilution	X	X	X	X	X	X
Rod Withdrawal[6]	X	X	X			

Notes:

1. Large and medium LOCAs are not considered in Modes 4, 5 and 6 since the RCS pressure is much lower than in Modes 1, 2 and 3.
2. Small LOCAs in Modes 4, 5 and 6 are primarily loss of inventory events due to alignment issues and open valves, not pipe breaks or random failures of RCP seals.
3. SGTRs are not considered in Modes 4, 5 and 6 since the delta P across the tubes (P_{RCS} - $P_{secondary\ side}$) is much lower than in Mode 3.
4. Secondary side breaks are not considered in Modes 5 and 6 since the secondary side pressure is much lower than in Modes 3 and 4.
5. RCP seal LOCAs are not considered in Modes 4, 5 and 6 since the RCS pressure and temperature are much less than in Mode 3. SGTRs have also been excluded from Mode 4 since the expected SGTR pressure difference is less than that at power.
6. Rod withdrawal is not considered in Modes 5 and 6 since the reactor trip breakers are open.
7. Loss of MFW is applicable to plants that start up on MFW. In this case, this event is the same as the Loss of Decay Heat Removal event.

Table 4
Candidate Systems and Components Exempted from 3.0.4 Relaxation

System/Component	MODE			
	2 (Startup)	**3 (Hot Standby)**	**4 (Hot Shutdown)**	**5 (Cold Shutdown)**
SDC*	Component Not Required	Component Not Required	Component Not Required	Relaxation Not Allowed
LTOP/PORVs (when used for LTOP)	Component Not Required	Component Not Required	Component Not Required above Set Temperature otherwise relaxation not allowed	Relaxation Not Allowed
EGD*	Relaxation Not Allowed	Relaxation Not Allowed	Relaxation Not Allowed	Relaxation Not Allowed
RPS	Relaxation Not Allowed	Component Not Required	Component Not Required	Component Not Required
HPSI and LPSI	Relaxation Allowed	Relaxation allowed above [1700 PSIA] only Otherwise Relaxation Not Allowed	Relaxation Not Allowed	Component Not Required
AFW/EFW*	Relaxation Not Allowed	Relaxation Not Allowed**	Relaxation Not Allowed**	Component Not Required

* Support systems required for operability.

** Restricted relaxation may be allowed based on results of PSA risk assessments.

\+ There is an expectation that one train of HPSI be available.

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ATTACHMENT 4
WOG
Qualitative Risk Assessment Supporting Increased Flexibility
in
MODE Restraints

QUALITATIVE RISK ASSESSMENT SUPPORTING INCREASED FLEXIBILITY IN MODE RESTRAINTS

WOG Program: Risk-Informed Technical Specifications Improvements
MUHP-3015

January 2002

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ACRONYMS

AFW	-	Auxiliary Feedwater
ATWS	-	Anticipated Transient Without Scram
BWR	-	Boiling Water Reactor
CEOG	-	Combustion Engineering Owner Group
CCP	-	Centrifugal Charging Pump
CVCS	-	Chemical and Volume Control System
DG	-	Diesel Generator
EDG	-	Emergency Diesel Generator
FW	-	Feedwater
HFASA	-	High Flux At Shutdown Alarm
LOCA	-	Loss of Coolant Accident
LCO	-	Limiting Condition for Operation
MFW	-	Main Feedwater
PORV	-	Power Operated Relief Valve
PRA	-	Probabilistic Risk Assessment
PWR	-	Pressurized Water Reactor
PZR	-	Pressurizer
RCP	-	Reactor Coolant Pump
RCS	-	Reactor Coolant System
RHR	-	Residual Heat Removal
SG	-	Steam Generator
SGTR	-	Steam Generator Tube Rupture
SI	-	Safety Injection
SLI	-	Steamline Isolation
SSPS	-	Solid State Protection System
RITS	-	Risk-Informed Technical Specifications
TSTF	-	Technical Specification Task Force

1.0 Objective

Provide the qualitative risk assessment to identify the systems/components required to be available prior to changing modes during plant startup to power operation.

2.0 Background

Initiative 3 of the industry's Risk-Informed Technical Specification (RITS) Program addresses a global change to the Standard Technical Specifications that will allow Mode changes to be made while relying on Action statements to satisfy the requirements of the LCO. Currently, LCO 3.0.4 states "When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified conditions in the Applicability for an unlimited period of time." This restrictive requirement can delay the startup of a plant and in many situations it is overly restrictive. A nearly completed maintenance activity can delay a mode change and adversely impact a utility's plan for plant startup and return to power operation. A mode change is prohibited by the Technical Specifications, except as noted above, with certain equipment inoperable even though once in the mode of interest or at-power the plant may be able to operate for a limited period with the same equipment inoperable. This proposed change will allow mode changes with equipment inoperable consistent with the applicability of that mode.

The industry developed TSTF-359 (Standard Technical Specification Change Traveler, Reference 1) for this proposed change and provided it to the NRC for review and approval. The Traveler addressed the impact of this change on risk in a qualitative manner. As stated in the Traveler:

> *"A qualitative review of initiating event frequencies, considering lower MODE (2, 3, or 4 for PWRs, 2 or 3 for BWRs) accident mitigation features and the activities associated with the lower MODES was performed and the review indicates that this proposed change is reasonable and acceptable. Based on the review, systems/components were identified that would be more important or less important in non-MODE 1 operation based on initiating event. The review identified a small number of systems/components in which, based on an increased potential for a particular initiating event in the lower MODES, entry into a MODE of Applicability would potentially have a greater impact in MODES 2-4 than they would in MODE 1."*

The NRC provided the following comment from their review:

> *"The industry should provide the "qualitative review", mentioned under "Risk Discussion" in the submittal, for the staff's review. In addition, a systematic investigation of likely changes in Modes or other specified conditions of operation and a "feeling" for the associated risks could provide useful information to support an implementation approach for the proposed change. For example, such investigation may show that no detailed PRA models are needed to compare risks, including risks associated with "transition" modes of operation."*

The "qualitative review" was based on the CEOG's work with the PRA model for the San Onofre Nuclear Generating Station. Its applicability to plants for the other Owners Groups is not specified or discussed in the Traveler. To resolve this issue, the industry agreed to provide the NRC the requested "qualitative review" for each Owners Group.

3.0 Approach

A qualitative assessment was used to identify the specific equipment that is required to be available prior to specific mode transitions. In this assessment, consideration is given to events that are unique to the specific mode being entered or that have an increased probability of occurrence in the mode being entered, and the availability of required mitigation systems. The basis for this assessment is a qualitative comparison to at-power plant operation in Mode 1. The risk from at-power operation is well understood, and generally associated with the highest level of plant risk, therefore, operation in the lower modes with equipment unavailable should not be more limiting than operation in Mode 1 unless:

- there are unique events to the mode of interest,
- the typical events in the mode of interest have an increased probability of occurrence, or
- the mode of interest has a reduced mitigation system capability.

For this assessment, it is necessary to understand the key plant changes that occur during the mode changes so it is possible to identify the initiating events that can occur and systems available for event detection, actuation, and mitigation.

The following mode changes are considered:

- Mode 6 to 5
- Mode 5 to 4
- Mode 4 to 3
- Mode 3 to 2
- Mode 2 to 1

3.1 RCS Parameters and Status of Key Systems

The qualitative approach requires an understanding of the plant conditions when entering and exiting the different modes. This includes the status of plant parameters and availability of event mitigation systems. Table 1 provides a summary of the important reactor coolant system (RCS) parameters for the different mode transitions. This table also provides the Tech Spec temperatures and power levels specified for the different modes. Only mode changes when returning to power are under consideration.

Table 2 provides the status of the key systems for the different modes. This shows the status or availability of the primary event actuation and mitigation systems, and several key normal operating systems. This table is not a comprehensive list of plant operating or standby systems nor is it intended to be such a list. The support systems for these systems are also required.

3.2 Key Activities in Progress

The following provides a summary of the typical key activities that are in progress when returning to power for the mode transitions. This is based on a typical Westinghouse plant.

<u>Modes 6-5</u>

- Install pressurizer safeties and manways (Mode 6)
- RCS fill and vent (Mode 6)
- Establish RCS charging and letdown (Mode 6)
- Establish RCS seal injection flow (Mode 6)
- Establish cold overpressure protection (Mode 6) (RCS will be water solid at some point in Mode 5)

- Lower steam generator (SG) levels (Mode 6)
- Increase RCS temperature from ~130^{o}F to ~185^{o}F (transition to Mode 5 occurs when RCS temperature exceeds 140^{o}F, per the Improved Tech Specs transition to Mode 5 occurs when the RCS temperature is >200^{o}F and all head closure bolts are fully tensioned)
- Increase RCS pressure from open-to-containment to ~340 psig
- RCS cooling by residual heat removal (RHR) system (Modes 6 and 5)

<u>Modes 5-4</u>

- Establish pressurizer bubble (Mode 5) (RCS will be water solid at some point in Mode 5)
- Place centrifugal charging pumps (CCP) in standby after bubble established (Mode 5)
- Place solid state protection system (SSPS) in service (Mode 5)
- Increase RCS temperature from ~185^{o}F to ~330^{o}F (transition to Mode 4 occurs when RCS temperature exceeds 200^{o}F)
- Verify auxiliary feedwater (AFW) aligned for startup (Mode 4)
- Maintain RCS pressure at ~340 psig
- RCS cooling by RHR (Mode 5 and lower end of Mode 4)
- Cold overpressure protection in service (Mode 5 and lower end of Mode 4)

<u>Mode 4-3</u> (lower end of mode 4 on RHR, then switch to AFW)

- Prepare SGs for startup (Mode 4)
- Restore AFW actuation signals and AFW components for automatic actuation (Mode 4)
- Place RHR system in standby (lower end of Mode 4)
- Block cold overpressure protection system (Mode 4)
- Initiate AFW (note that at some plants, a startup feedwater pump or condensate pumps and main feedwater (MFW) may be used for startup instead of AFW) (Mode 4)
- Increase RCS temperature from ~330^{o}F to ~557^{o}F (transition to Mode 3 occurs when RCS temperature exceeds 350^{o}F)
- Increase RCS pressure from ~340 psig to ~2235 psig
- Start remaining RCPs (Mode 3)
- Verify pressurizer (PZR) pressure safety injection (SI) and steamline pressure SI and steamline isolation (SLI) auto reset (Mode 3)
- RCS heatup controlled by condenser steam dumps and SG atmospheric relief valves

<u>Mode 3-2</u>

- Close reactor trip breakers (Mode 3)
- Withdraw shutdown and control banks (Mode 3)
- Raise power to less than 5% (Mode 3 to 2)

<u>Mode 2-1</u>

- Transfer from AFW to MFW (note that some plants may already be on MFW depending on their MFW design and approach to plant startup) (Mode 1)
- Increase power (Mode 1)
- Bring turbine on-line (Mode 1)

3.3 Initiating Events

Table 3 provides a summary of the initiating events by mode. The following discusses the applicability of each initiating event in each mode.

Large LOCAs: Large LOCAs are due to RCS pipe breaks. These are most likely when the RCS is at operating pressure which occurs in Modes 1, 2, and 3. The frequency of occurrence is expected to be the same for each mode.

Medium LOCAs: Medium LOCAs are due to RCS pipe breaks. These are most likely when the RCS is at operating pressure which occurs in Modes 1, 2, and 3. The frequency of occurrence is expected to be the same for each mode.

Small LOCAs: Small LOCAs are due to RCS pipe breaks, stuck open safety valves or power operated relief valves (PORV), random failures of RCP seals, or mis-aligned systems. Pipe breaks are most likely when the RCS is at operating pressure which occurs in Modes 1, 2, and 3, and the frequency of the pipe break contribution to the initiating event frequency is expected to be the same for each of these modes. Stuck open safety valves or PORVs can occur as a result of transient events which lead to increased RCS pressures, such as, total loss of main feedwater and turbine trip. These are Mode 1 events (the plant is on main feedwater with the turbine operating only in Mode 1). Random failures of RCP seals are also most likely when the RCS is at operating pressure and temperature which occurs primarily in Modes 1, 2, and 3. Mis-alignment issues that can lead to LOCAs (also referred to as loss of inventory events) occur most frequently in the lower end of Mode 4 when the RCS cooling is switched between the RHR system and AFW.

Contributors to small LOCAs by mode:

- Mode 1: RCS pipe breaks, stuck open safety valves or PORVs, random failures of RCP seals
- Mode 2: RCS pipe breaks, random failures of RCP seals
- Mode 3: RCS pipe breaks, random failures of RCP seals
- Mode 4: Mis-alignment issues due to switch between RHR and AFW
- Mode 5: Mis-alignment issues related to RHR cooling (lower frequency than for Mode 4).

The frequency of a small LOCA is expected to be lower in Modes 2 and 3, than in Mode 1 since consequential LOCAs are not expected to occur in Modes 2 and 3. The frequency of a small LOCA, or loss of inventory event, in Mode 4 has been seen to be a significant contributor to plant risk. The frequency of a small LOCA in Mode 5 is expected to be lower than in Mode 4 since RHR cooling is already established in Mode 5 and mis-alignment issues reduced.

RCP Seal LOCAs (loss of seal cooling): RCP seal LOCAs resulting from loss of seal cooling due to complete failure of component cooling water or service water are most likely when the RCS temperature and pressure are high. This occurs in Mode 1, 2, and 3. In the lower modes the RCS temperature is lower so the seals would not be subject to the high temperatures. In addition, the RCS pressure is significantly reduced in the lower operating modes.

General Transients: The general transients group includes loss of main feedwater and turbine trip events. As previously noted some plants use condensate pumps and MFW to return to power. These events can primarily occur when the reactor is at a power level greater than 5% in Mode 1. At power levels less than 5%, the main feedwater system may or may not be operating and the turbine is not online.

Loss of Decay Heat Removal: Loss of decay heat removal is applicable to Modes 2-6. Decay heat is being removed by the AFW system (or possibly the startup feedwater systems and condensate pumps and MFW) in Modes 2 and 3, and the upper part of Mode 4. RHR decay heat removal is in effect in the lower part of Mode 4, and Modes 5 and 6. In Mode 4, the switch between RHR cooling and AFW can lead to an increased frequency of occurrence of this event. When entering Mode 5 from Mode 6 the RCS is depressurized and RCS loops may not be filled. Under this situation there is an increased potential for loss of decay heat removal.

Loss of Offsite Power: This event is applicable to all modes of operation. If work is ongoing in the switchyard, there is an increased probability of a loss of offsite power event. Work in the switchyard usually occurs in the lower modes and not in Mode 1. In addition, with deregulation it is speculated that the grid stability may be degraded with power plants offline. Therefore, a loss of offsite power may become more likely when a plant is not online.

Steam Generator Tube Ruptures: Steam generator tube ruptures are of concern when there is a high pressure difference across the steam generator tubes. This occurs when the RCS is at a high pressure and the secondary side is at normal operating pressure or lower. This event is of interest in Modes 1, 2, 3, and the upper end of Mode 4 prior to reducing the RCS pressure. There is no significant difference in event frequency between these modes.

Secondary Side Breaks: Secondary side breaks are of concern when the secondary side is at normal operating pressure which is in Modes 1, 2, 3, and 4. There is no significant difference in event frequency between these modes.

Cold Overpressurization: Cold overpressurization is of greatest interest when the RCS is water solid. This occurs during Mode 5 operation. Cold overpressurization is also of interest in Mode 4.

ATWS: The ATWS event is only of concern when the reactor is at power. In Modes 3-6 the reactor is at 0 power with the control rods inserted, therefore, ATWS is not possible. In Mode 2 the initial power level is less than 5%, and the high RCS pressures associated with an ATWS event will not occur. Therefore, this event is of primary interest in Mode 1.

Rod Withdrawal: Rod withdrawal events can only occur when the rods are at least partially in the core and the reactor trip breakers are closed. This situation can occur in Modes 1-3.

Boron Dilution: The boron dilution event is of interest in all modes of operation and results primarily from lower boron concentration makeup being returned to the RCS related to malfunctions of the CVCS. There is no significant difference in event frequency between the modes.

3.4 Mode Entry Equipment Restrictions

Based on the previous information, the following are identified as the key events or plant perturbations, that could lead to a higher risk level in the lower modes of plant operation compared to the risk level for at-power operation. From this the limitations on equipment unavailability for mode entry is determined and provided. This information is provided by plant mode.

Mode 5

The events of interest in Mode 5 are loss of inventory, loss of RCS heat removal, loss of offsite power, dilution, and cold overpressurization. On initial entry into Mode 5 the RCS generally will be depressurized and loops not filled. Under these conditions the potential for loss of decay heat removal is increased. To reduce the risk from this event both trains of RHR should be available. There are no other significant plant perturbations that can impact plant safety in Mode 5 except for RCS overpressurization. The RCS is susceptible to cold overpressurization due to RCS temperature and potential water solid conditions. The cold overpressurization event is unique to Modes 5 and 4; it represents a risk not considered in the other modes. The cold overpressure protection system is designed to mitigate these events. This includes the associated support systems.

Limitation: Prior to entering Mode 5, both trains of RHR need to be available, with one train in service, and the cold overpressure protection system is required to be in service.

Mode 4

The events of interest in Mode 4 are loss of inventory, loss of decay heat removal, loss of offsite power, secondary side breaks, boron dilution, and cold overpressurization. The key activities in Mode 4 involve the switch from RHR cooling to AFW cooling (or to startup feedwater or condensate/main feedwater pumps) and the increase in RCS temperature. During this switch the plant is susceptible to loss of RCS heat removal and loss of inventory events. The loss of inventory events, due to RHR system mis-alignments, have been shown to contribute significantly to the risk of Mode 4 operation in shutdown PRA models. To reduce the risks from these two events it is important to ensure the appropriate mitigation systems are available. These include the AFW system to maintain heat removal and the high head safety injection system to supply coolant for inventory control. For plants starting up on startup FW or main FW, the AFW system is a backup system and represents one of several methods to provide for decay heat removal, therefore, AFW is not as important for heat removal. Cold overpressurization is also important in the lower end of Mode 4. The cold overpressurization protection system is designed to mitigate this event.

Limitations: Prior to entering Mode 4, the AFW system and the high head safety injection systems are required to be available. This includes the associated support systems. For plants not starting up on AFW, there are no AFW limitations for entering Mode 4. The cold overpressure protection system is also required to be in service.

Mode 3

The events of interest in Mode 3 are loss of coolant events, loss of decay heat removal, loss of offsite power, SG tube rupture, secondary side breaks, dilution, and rod withdrawal events. The key activities in Mode 3 involve the RCS temperature and pressure increase, and withdrawing the shutdown and control rods. The probability of and risk from most events are the same or less than at-power operation since the decay heat level is lower during a startup from a lower mode than the decay heat level following a reactor trip, the initiating event frequencies for the potential events are approximately equal to or less than those in Mode 1, and the same mitigation systems are available. The plant is dependent on AFW or startup FW or main FW, depending on the plant, for RCS heat removal. For plants starting up on startup FW or main FW, the AFW system is a backup system and represents one of several methods to provide for decay heat removal. For these plants AFW is no more important in Mode 3 than Mode 1. For plants dependent on AFW for startup, AFW is a more important system since it would also be called on to mitigate a failure of decay heat removal.

Limitations: For plants starting up on AFW, prior to entering Mode 3, the AFW system is required to be available. This includes associated support systems. For plants not starting up on AFW, there are no limitations for entering Mode 3.

Mode 2

The events of interest in Mode 2 are the same as those for at-power operation with the exception of loss of main feedwater (although loss of decay heat removal is applicable), turbine trip, and ATWS. The key activities in Mode 2 involve increasing the reactor power level to less than 5%. The probability of and risk from most events are the same or less than when at-power since the decay heat level is lower during a startup from a lower mode than the decay heat level following a reactor trip, the initiating event frequencies for the potential events are approximately equal to or less than those in Mode 1, and the same mitigation systems are available. The plant is dependent on AFW or startup FW or main FW, depending on the plant, for RCS heat removal. For plants starting up on startup FW or main FW, the AFW system is a backup system and represents one of several methods to provide for decay heat removal. For these plants AFW is no more important in Mode 2 than Mode 1. For plants dependent on AFW for startup, AFW is a more important system since it would also be called on to mitigate a failure of decay heat removal.

Limitations: For plants starting up on AFW, prior to entering Mode 2, the AFW system is required to be available. This includes associated support systems. For plants not starting up on AFW, there are no limitations for entering Mode 2.

Mode 1

The events of interest in Mode 1 are provided on Table 3. The key activities in Mode 1 involve increasing the reactor power level to 100%, transferring from AFW or startup feedwater to main feedwater (some plants may already be on MFW), and bringing the turbine on-line. These startup activities provide for an increased probability of loss of feedwater flow to the steam generators. During this phase of the startup, the plant is more dependent on AFW than when operating at steady-state conditions due to the increased potential for loss of feedwater or turbine trip. A degraded AFW system puts the plant into a more susceptible condition with regard to decay heat removal.

Limitations: Prior to entering Mode 1, the AFW system is required to be available. This includes the associated support systems.

Modes 1-5

Operation in the lower modes offers a higher potential for loss of offsite power if there are activities ongoing in the switchyard as the plant is being brought up in modes. With deregulation it is speculated that the grid stability may be degraded with power plants offline. Since there may be an increased dependence on the emergency diesel generators (EDGs) to supply the required electrical power when the plant is offline, the DGs should be available prior to changing modes.

Limitation: Prior to entering Modes 1, 2, 3, 4, and 5, the EDGs are required to be available. In addition, the associated support systems are required to be available.

4.0 Summary

A qualitative risk assessment was performed to identify systems/components that should be required to be available prior to changing modes during plant startup to power operation. These limitations are summarized on Table 4.

5.0 References

1. Industry/TSTF Standard Technical Specification Change Traveler, “Increased Flexibility in MODE Restraints”, TSTF-359, Rev. 1.

Table 1
Key Plant Parameters by Technical Specification Mode

Parameter	Mode 6 to Mode 5	Mode 5 to Mode 4	Mode 4 to Mode 3	Mode 3 to Mode 2	Mode 2 to Mode 1	Mode 1
Tech Spec RCS Temperature	NA (Mode 6, Refueling)	≤ 200°F (Mode 5, Cold Shutdown)	>200°F to <350°F (Mode 4, Hot Shutdown)	≥350°F (Mode 3, Hot Standby)	≥350°F (Mode 2, Startup)	≥350°F (Mode 1, Power)
Tech Spec Reactor Power Level	0% (Mode 6)	0% (Mode 5)	0% (Mode 4)	0% (Mode 3)	≤5% (Mode 2)	>5% (Mode 1)
RCS Temperature	~130°F to ~185°F	~185°F to ~330°F	~330°F to ~557°F	~557°F	~557°F	~557°F
RCS Pressure	Containment to ~340 psig	~340 psig	~340 psig to ~2235 psig	~2235 psig	~2235 psig	~2235 psig
Pressurizer Status	Open to containment to water solid	Water solid to bubble	Bubble	Bubble	Bubble	Bubble
Secondary Side Pressure	0 psig	0 psig	Normal operating pressure	Normal operating pressure	Normal operating pressure	Normal operating pressure

Table 2 System Status by Technical Specification Mode						
System	**Mode 6**	**Mode 5**	**Mode 4**	**Mode 3**	**Mode 2**	**Mode 1**
RCS Charging and Letdown[1]	Establish function	In service	In service	In service	In service	In service
Reactor Coolant Pumps	None running	As needed for plant heatup	As needed for plant heatup	All RCPs running	All RCPs running	All RCPs running
Reactor Trip Breakers	Open	Open	Open	Open/Closed	Closed	Closed
Residual Heat Removal	In service	In service	In service or in standby	Standby	Standby	Standby
Auxiliary Feedwater	Out of service	Out of service	Aligned for startup or in service	In service	In service	In service & then standby after switch to MFW
High Head Injection[1]	Pull to lock	Pull to lock when water solid, stand-by with bubble	Standby	Standby	Standby	Standby
Cold Overpressure Protection	Establish function	In service	In service[2]	Not required	Not required	Not required
High Flux At Shutdown Alarm (HFASA)	In service	In service	In service	In service	Not required	Not required
Source Range	Two channels in service	Two channels in service	Two channels in service	Two channels in service	Two channels in service below P-6	Not required
Intermediate Range	Not required	Not required	Not required	Not required	Two channels in service	Two channels in service below P-10
Power Range	Not required	Not required	Not required	Not required	Required	Required
Solid State Protection System	Not required	Not required	In service	In service	In service	In service
Emergency Diesel Generators	Less than full complement	Less than full complement	Full complement	Full complement	Full complement	Full complement

Notes:
1. One charging pump is operating to provide RCS charging in Modes 1-6.
2. Cold overpressurization is required in the lower part of Mode 4.

Table 3 Initiating Events by Technical Specification Mode						
Initiating Event	**Mode 1**	**Mode 2**	**Mode 3**	**Mode 4**	**Mode 5**	**Mode 6**
Large LOCA[1]	X	X	X			
Medium LOCA[1]	X	X	X			
Small LOCA/loss of inventory[2]	X	X	X	X	X	X
RCP Seal LOCAs (loss of seal cooling)[5]	X	X	X			
Loss of Main Feedwater	X					
Turbine Trip	X					
Loss of Decay Heat Removal[7]		X	X	X	X	X
Loss of Offsite Power	X	X	X	X	X	X
Cold Overpressurization				X	X	
SG Tube Rupture[3]	X	X	X			
Secondary Side Breaks[4]	X	X	X	X		
ATWS	X					
Boron Dilution	X	X	X	X	X	X
Rod Withdrawal[6]	X	X	X			

Notes:
1. Large and medium LOCAs are not considered in Modes 4, 5, and 6 since the RCS pressure is much lower than in Modes 1, 2, and 3.
2. Small LOCAs in Modes 4, 5, and 6 are primarily due to alignment issues and open valves, not pipe breaks or random failures of RCP seals.
3. SGTRs are not considered in Modes 4, 5, and 6 since the delta P across the tubes (P_{RCS} - $P_{secondary\ side}$) is much lower than in Mode 3.
4. Secondary side breaks are not considered in Modes 5 and 6 since the secondary side pressure is much lower than in Modes 3 and 4.
5. RCP seal LOCAs are not considered in Modes 4, 5, and 6 since the RCS pressure and temperature are much lower than in Mode 3.
6. Rod withdrawal is not considered in Modes 4, 5, and 6 since the reactor trip breakers are open.
7. Loss of MFW is applicable to plants that start up on MFW. In this case, this event is the same as the Loss of Decay Heat Removal event.

Table 4 **Summary of Mode Change Limitations**	
To Enter Plant Operating Mode	Limitations to Enter Plant Operating Mode
5	• Two trains of RHR available, one train of RHR in service • Cold overpressure protection system in service • EDGs available • The systems supporting the operation of the above systems
4	• AFW system available (consistent with the plant specific Technical Specifications and only if dependent on AFW for startup) • High head safety injection available • Cold overpressure protection system in service • EDGs available • The systems supporting the operation of the above systems
3	• AFW system available (only if dependent on AFW for startup) • EDGs available • The systems supporting the operation of the above systems
2	• AFW system available (only if dependent on AFW for startup) • EDGs available • The systems supporting the operation of the above systems
1	• AFW system available • EDGs available • The systems supporting the operation of the above systems

ATTACHMENTS

The Owners Groups Qualitative Risk Assessments are attached.

ATTACHMENT 1
BWROG
Technical Justification To Support Risk Informed Improvements to Technical Specification MODE Restraints for BWR Plants

GE-NE A13-00464-02 (Rev. 2)
DRF A13-00464
December 2000

GENERAL ELECTRIC COMPANY

TECHNICAL JUSTIFICATION TO SUPPORT RISK-INFORMED IMPROVEMENTS TO TECHNICAL SPECIFICATION MODE RESTRAINTS FOR BWR PLANTS

BWR Owners' Group
Risk-informed Technical Specification Committee

IMPORTANT NOTICE REGARDING CONTENTS OF THIS REPORT

Please Read Carefully

CONTENTS

APPENDICES

LIST OF TABLES

1. EXECUTIVE SUMMARY

This report addresses systems/components required to be available prior to changing Modes during plant startup in accordance with Initiative 3 of the BWR Owners' Group candidates for risk-informed improvements to plant Technical Specifications. Initiative 3 is related to revising Limiting Condition for Operation (LCO) 3.0.4 in the Improved Technical Specifications (ITS) to allow entry into a Mode or specified condition in the Applicability while relying on the associated ACTIONS, provided that there is a risk evaluation or ACTIONS to be entered permit continued operation in the Mode or other specified condition in the Applicability for an unlimited period of time. This report provides a generic pre-assessment risk evaluation to identify those systems/components that are important in BWR PSAs. For these systems/components, a configuration-specific risk evaluation should be performed before entry into a different Mode when an LCO is not met.

2. INTRODUCTION/BACKGROUND

During 1999, the BWR Owners' Group formed a Committee to identify risk-informed Technical Specifications (TS) improvements. This activity was part of a NRC and Industry Joint Owners' Group program to define and implement risk-informed Technical Specification changes. Seven initiatives were identified as potential candidates for risk-informed Technical Specifications improvements. The first of these initiatives concerns required actions when a TS LCO is not met. This has been analyzed and a risk-informed submittal is being made to NRC separately. The generic Model developed for Initiative 1 and insights obtained from other Industry full power PSAs serve as the basis for this report.

Initiative 3, the subject of this report, addresses increased flexibility in Mode restraints by allowing Mode changes to be made while relying on ACTION statements to satisfy the requirements of an LCO. LCO 3.0.4 states "When an LCO is not met, entry into a Mode or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the Mode or other specified condition in the Applicability for an unlimited period of time." The allowance to enter Modes or specified conditions in the Applicability while relying on ACTIONS is given because ACTIONS which permit continued operation of the unit for an unlimited period provide an acceptable level of safety for continued operation. This is without regard to the status of the unit before or after the Mode change.

The allowances of LCO 3.0.4 are based on NRC Generic Letter 87-09 which states, "Specification 3.0.4 unduly restricts facility operation when conformance with Action Requirements provides an acceptable level of safety for continued operation. For an LCO that has Action Requirements permitting continued operation for an unlimited period of time, entry into an operation Mode or other specified condition of operation should be permitted in accordance with the Action Requirements."

In the development of ITS, many improvements were made to LCO 3.0.4 including clarification of its applicability regarding normal shutdown and Required Action shutdowns, and Mode changes during Cold Shutdown and Refueling Operations. During ITS development, almost all the LCOs with Allowed Outage Times (AOTs) greater than or equal to 30 days, and many of the LCOs with AOTs greater than or equal to 7 days, were given individual LCO 3.0.4 exceptions. During many plant specific ITS conversions, individual plants provided justifications for other LCO 3.0.4 exceptions. These specific exceptions allow entry into a Mode or specified condition in the Applicability while relying on these ACTIONS.

ITS LCO 3.0.4 and SR 3.0.4 are still overly restrictive. The startup of a unit is frequently delayed due to the current restrictions of LCO 3.0.4. For example, a single maintenance activity that is almost complete can cause significant delays and changes in the previously well thought out plans for returning the unit to service. Allowing the unit to enter Mode of applicability for that specification would allow the work to be completed without creating error likely situations and avoid changes in other activities.

The purpose of this task is to identify risk-significant systems during various Modes of plant operation. For systems that are risk-significant for operation in Modes 1, 2 and 3 certain restrictions will be retained even after relaxation of TS3.0.4.

3. TECHNICAL APPROACH

Risk-significant systems during various Modes of plant operation can be identified by a combination of specific PSA studies and risk insights from Industry PSAs. Systems which are risk-significant during shutdown Mode 3 are identified by performing sensitivity studies using the generic BWR Mode 3 PSA Model developed for addressing Initiative 1 (Reference 1). For the BWR plant types not specifically modeled by the above PSA model, the above PSA results were augmented by insights from other Industry PSAs. For low power operation (Mode 2) and full power operation (Mode 1), risk-significant systems are identified based on risk insights from Industry PSAs and the generic BWR risk model previously discussed.

Risk Achievement Worth (RAW) is used to identify the importance of a particular system or basic event in the PSA. RAW of a system identifies the factor of increase over the base case Core Damage Frequency (CDF) when the system is unavailable with 100% certainty. The RAW values are obtained and studied to find out the relevance of the basic event (and the affected systems) to the core damage event.

LCO 3.0.1 or individual LCOs prohibit loss of safety function (two trains out-of-service) even with LCO 3.0.4 relaxed, therefore, common mode failure conditions are prevented.

4. ANALYSIS RESULTS

Generic lists of Risk-Significant BWR systems/components are provided in Tables 1 through 3. These Tables represent those systems/components that are Risk-Significant in any one of the operating Modes (Modes 1, 2, or 3). The Risk-Significant systems/components listed in these Tables would require a risk evaluation to determine the acceptability for changes in Modes or other specified conditions in the Applicability when an LCO is not met. Requirements of LCO 3.0.4 are not applicable for Modes 4 and 5. However, list of important systems in Mode 4 are also provided solely for the purposes of understanding the differences in the various modes and does not present Mode restraints while moving from Mode 5 to Mode 4.

Because the systems in the following tables have been identified based on generic models, individual plants may refine the list of risk significant systems for their plant as appropriate using plant-specific analysis.

Table 1

List of Risk-Significant BWR Systems/Components During Full Power (Mode 1)

- Reactor Protection System (RPS)
- High Pressure Coolant Injection (HPCI) System – BWR 3 and 4 plants
- High Pressure Core Spray (HPCS) – BWR 5 and 6 plants
- Reactor Core Isolation Cooling (RCIC) System - BWR 3, 4, 5 and 6 plants
- Isolation Condenser - BWR 2 plants
- Emergency/Shutdown AC Power
- Diesel Generators
- Hardened Wetwell Vent System - BWR 2, 3, and 4 plants with Mark I Containment
- Vital DC Bus Power
- Service Water System (Systems that provide cooling to ECCS components and rooms and the RHR System)

Table 2

List of Risk-Significant BWR Systems/Components During Low Power (Mode 2)

- Reactor Protection System
- High Pressure Coolant Injection System – BWR 3 and 4 plants
- High Pressure Core Spray – BWR 5 and 6 plants
- Reactor Core Isolation Cooling System - BWR 3, 4, 5 and 6 plants
- Isolation Condenser - BWR 2 plants
- Emergency/Shutdown AC Power
- Diesel Generators
- Hardened Wetwell Vent System - BWR 2, 3, and 4 plants with Mark I Containment
- Vital DC Bus Power
- Service Water System (Systems that provide cooling to ECCS components and rooms and the RHR System)

Table 3

List of Risk-Significant BWR Systems/Components During Shutdown (Mode 3)

- Emergency/Shutdown AC Power
- Diesel Generators
- Hardened Wetwell Vent System - BWR 2, 3, and 4 plants with Mark I Containment
- Vital DC Bus Power
- Service Water System (Systems that provide cooling to ECCS components and rooms and the RHR System)

Table 4

List of Important BWR Systems/Components During Shutdown (Mode 4)

- Emergency/Shutdown AC Power
- Diesel Generators
- Vital DC Bus Power
- Service Water System (Systems that provide cooling to ECCS components and rooms and the RHR System)
- Residual Heat Removal System

5. CONCLUSION

Based on a combination of PSA results and engineering judgment, a number of risk significant systems have been identified. It is concluded that the Technical Specification paragraph LCO 3.0.4 requirements can be relaxed to permit Mode changes for the remaining systems. For the risk-significant systems it is recommended that Mode change be permitted only following a risk assessment by the licensee. It is expected that the risk assessments would be similar to those needed to support the paragraph (a)(4) of 10 CFR 50.65 Maintenance Rule.

6. REFERENCES

6.1 GE-NE A13-00464, "Technical Justification to Support Risk Informed Modification to selected Required Action end States for BWR Plants", BWR Owners' Group Risk Informed Technical Specification Committee (to be published December 2000).

Appendix A

Table A-1

PARTICIPATING UTILITIES

Utility	Plant	BWR Type	Containment Type
Alliant Utilities Inc	Duane Arnold	4	I
AmerGen-CPS	Clinton	6	III
Carolina Power & Light	Brunswick 1 & 2	4	I
ComEd	Dresden 2 & 3 Quad Cities 1 & 2 LaSalle 1 & 2	3 3 5	I I II
Detroit Edison	Fermi 2	4	I
Energy Northwest	Columbia Generating Station	5	II
Entergy Nuclear Generating Co.	Pilgrim	3	I
Entergy Operations Inc.	River Bend Grand Gulf	6 6	III III
FirstEnergy	Perry 1	6	III
GPU Nuclear	Oyster Creek	2	I
Nebraska Public Power District	Cooper	4	I
New York Power Authority	Fitzpatrick	4	I
Niagara Mohawk Power Corp.	Nine Mile Point 1 Nine Mile Point 2	2 5	I II
Northern States Power	Monticello	3	I
PECO Energy	Peach Bottom 2 & 3 Limerick 1 & 2	4 4	I II
PPL Corp.	Susquehanna 1 & 2	4	II
Public Service Electric & Gas	Hope Creek	4	I
Southern Company Nuclear	Hatch 1 & 2	4	I
Tennessee Valley Authority	Browns Ferry 2 & 3	4	I
Vermont Yankee Nuclear Power	Vermont Yankee	4	I

ATTACHMENT 2
BWOG
Qualitative Risk Assessment for Increased Flexibility in MODE Restraints

BAW-2383

FRAMATOME
TECHNOLOGIES

B&W Owners Group Qualitative Risk Assessment for Increased Flexibility in MODE Restraints

October 1, 2001

TALE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

ADV	Atmospheric Dump Valve
ATWS	Anticipated Transient Without Scram
B&W	Babcock & Wilcox
BWR	Boiling Water Reactor
CEOG	Combustion Engineering Owners Group
CF	Core Flood
CRD	Control Rod Drive
DHR	Decay Heat Removal
EDG	Emergency Diesel Generator
EFW	Emergency Feedwater
HPI	High Pressure Injection
LCO	Limiting Condition for Operation
LOCA	Loss of Coolant Accident
LPI	Low Pressure Injection
LTOP	Low Temperature Overpressure Protection
MFW	Main Feedwater
MFWI	Main Feedwater Isolation
MSLI	Main Steam Line Isolation
NRC	Nuclear Regulatory Commission
PORV	Pilot Operated Relief Valve
PRA	Probabilistic Risk Assessment
P-S HT	Primary-to-Secondary Heat Transfer
PWR	Pressurized Water Reactor
PZR	Pressurizer
RBS	Reactor Building Spray
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RHR	Residual Heat Removal
RITS	Risk-Informed Technical Specification
RPS	Reactor Protection System
RV	Reactor Vessel
SG	Steam Generator
STS	Standard Technical Specifications
TBV	Turbine Bypass Valve
TSTF	Technical Specification Task Force

1.0 OBJECTIVE

The objective of this evaluation is to perform a qualitative risk assessment that identifies those plant systems deemed to be more important during startup and return to power than when in Mode 1.

2.0 BACKGROUND

Initiative 3 of the industry's Risk-Informed Technical Specification (RITS) Program addresses a global change to Reference 1, Standard Technical Specifications (STS), that will allow Mode changes to be made while relying on Action statements to satisfy the requirements of the Limiting Conditions for Operation (LCO). Currently, LCO 3.0.4 states "When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified conditions in the Applicability for an unlimited period of time." This restrictive requirement can delay the startup of a plant and in many situations it is overly restrictive. A nearly completed maintenance activity can delay a mode change and adversely impact a utility's plan for startup and return to power operation. A mode change is prohibited by STS, except as noted above, with certain equipment inoperable even though once in the mode of interest or at-power the plant may be able to operate for a limited period with the same equipment inoperable. This proposed change to STS LCO 3.0.4 will allow a plant to change modes with equipment inoperable consistent with the applicability of that mode.

The industry developed a Technical Specification Task Force (TSTF) STS Change Traveler (Reference 2) for this proposed change and provided it to the NRC for review and approval. The Traveler addressed the impact of this change on risk in a qualitative manner. As stated in the Traveler:

> *"A qualitative review of initiating event frequencies, considering lower MODE (2, 3, or 4 for PWRs, 2 or 3 for BWRs) accident mitigation features and the activities associated with the lower MODES was performed and the review indicates that this proposed change is reasonable and acceptable. Based on the review, systems/components were identified that would be more important or less important in non-MODE 1 operation based on initiating event. The review identified a small number of systems/components in which, based on an increased potential for a particular initiating event in the lower MODES, entry into a MODE of Applicability would potentially have a greater impact in MODES 2-4 than they would in MODE 1."*

The NRC provided the following comment from their review:

> *"The industry should provide the 'qualitative review,' mentioned under 'Risk Discussion' in the submittal, for the staff's review. In addition, a systematic investigation of likely changes in Modes or other specified conditions of operation and a 'feeling' for the associated risks could provide useful information to support an implementation approach for the proposed change. For example, such investigation may show that no detailed*

PRA models are needed to compare risks, including risks associated with 'transition' modes of operation."

The "qualitative review" was based on the CEOG's work with the PRA model for the San Onofre Nuclear Generating Station. Its applicability to plants for the other Owners Groups is not specified or discussed in the Traveler. To resolve this issue, the industry agreed to provide the NRC the requested "qualitative review" for each Owners Group.

3.0 APPROACH

The qualitative approach used is to identify the specific equipment that is required to be available prior to specific mode transitions. In this assessment, consideration is given to events that are unique to a specific mode or that have an increased probability of occurrence in a specific mode, and the availability of required mitigation systems. The basis for this assessment is a qualitative comparison of risk associated with lower mode operation to at-power operation in Mode 1. The risk from at-power operation is well understood, and generally associated with the highest level of plant risk, therefore, operation in the lower modes with equipment available should not be more limiting than operation in Mode 1 unless:

- there are unique events to the mode of interest,
- the typical events in the mode of interest have an increased probability of occurrence, or
- the mode of interest has a reduced mitigation system capability.

For this assessment, it is necessary to understand the key plant changes that occur in each mode in order to identify initiating events that can occur and systems available to detect and mitigate those events.

The following mode changes are considered:

- Mode 6 to 5
- Mode 5 to 4
- Mode 4 to 3
- Mode 3 to 2
- Mode 2 to 1

3.1 Key Parameters and Systems

This qualitative approach, which only considers mode changes when returning to power, requires an understanding of relevant key plant conditions during each mode. These conditions include important reactor coolant system (RCS) parameters and the status of mitigation systems. This information is provided in Tables 1 and 2.

Table 1: Key Plant Parameters By STS Mode

Table 1 provides key RCS parameter information, including STS requirements and expected operational conditions. In order to provide some indication of integrated plant conditions, Table 1 also includes SG pressure.

<u>Table 2: Key System Status By STS Mode</u>
Table 2 provides the status of the key systems for the different modes. This includes the availability of event mitigation systems and key normal operating systems.

3.2 Key Activities in Progress by Mode

The following lists provide a summary of relevant typical key activities that occur when returning to power. The lists, configured by mode, are based on a typical B&W plant. To facilitate understanding of the information in the lists, an attempt has been made to list activities in an "idealized" chronological order assuming startup following refueling.

<u>Mode 6</u>
- RCS cooling by Decay Heat Removal (DHR) system (RCS temperature ~100°F to ~140°F)
- Install RV head
- Implement Low Temperature Overpressure Protection (LTOP) measures (required when all RV head closure bolts fully tensioned)
- Tension RV head closure bolts
- Transition to Mode 5 when all RV head closure bolts fully tensioned

<u>Mode 5</u>
- RCS cooling by DHR
- Install pressurizer (PZR) safeties and manways (could occur in Mode 6, but cannot proceed in Mode 5 until accomplished)
- RCS fill and vent (Reactor Coolant Pump (RCP) seals vented; normal seal injection not yet established)
- Establish RCS makeup and letdown
- Establish PZR bubble
- Startup circulating water and condensate systems; align main steam system for heatup, including turbine bypass valves (TBVs) and atmospheric dump valves (ADVs)
- Prepare steam generators (SGs) for plant heatup
- Establish containment integrity
- Close reactor trip breakers and withdraw one or more safety banks
- Maintain LTOP measures (Mode 5 and lower end of Mode 4)
- Lower SG levels
- Start one makeup pump and place RCP seals in service
- Align EFW to available status
- Start two RCPs to initiate heatup (some plants may start three RCPs)
- Secure DHR and establish low pressure injection (LPI) system in standby
- Place Reactor Building Spray (RBS) in standby
- Increase RCS temperature > 200°F (transition to Mode 4 occurs when RCS temperature ≥ 200°F)

<u>Mode 4</u>
- Maintain RCS pressure in accordance with applicable curves
- Start additional RCP (if only two started previously)

- RCS heatup controlled by turbine bypass valves
- Secure from LTOP measures (when RCS T_{cold} > [plant specific temperature])
- Align high pressure injection (HPI) system to standby
- Increase RCS temperature to > 330°F (transition to Mode 3 occurs when RCS ≥ 330°F)

Mode 3

- Align main feedwater (MFW) and start MFW pump
- Align core flooding (CF) system to standby
- Align systems controlled by EFIC (or appropriate Secondary Plant Protection System(s)) to standby (includes EFW, Main Steam Line Isolation (MSLI) and MFW Isolation (MFWI))
- Start fourth RCP when RCS temperature > low temperature interlock
- Insert control rods and remove shutdown bypass from all RPS channels (involves deenergizing reactor trip breakers)
- Reclose reactor trip breakers and withdraw required rod banks (safety banks)
- Withdraw regulating rod banks and achieve criticality (transition to Mode 2))

Mode 2

- Increase reactor power
- Transition to Mode 1 when reactor power > 5%

Mode 1

- Increase reactor power
- Bring turbine on-line
- Escalate power (start second MFW pump as appropriate)

3.3 Initiating Events

Table 3 provides a summary of the initiating events by mode. The following discusses the applicability of each initiating event in each mode.

Large LOCAs: Large LOCAs are due to RCS pipe breaks. These are most likely when the RCS is at operating pressure, which occurs in Modes 1, 2, and 3. The frequency of occurrence is expected to be the same for each mode.

Medium LOCAs: Medium LOCAs are due to RCS pipe breaks. These are most likely when the RCS is at operating pressure, which occurs in Modes 1, 2, and 3. The frequency of occurrence is expected to be the same for each mode.

Small LOCAs/Loss of Inventory: Small LOCAs are due to RCS pipe breaks, stuck open safety valves or stuck open power operated relief valve (PORV), random failures of RCP seals, or mis-aligned systems leading to loss of inventory. Pipe breaks are most likely when the RCS is at operating pressure, which occurs in Modes 1, 2, and 3. Stuck open safety valves or PORV can occur as a result of transient events that lead to increased RCS pressures, such as total loss of main feedwater and turbine trip. The turbine operates only in Mode 1 and other transient events will not challenge these valves at the expected low decay heat levels. Random failures of RCP seals are also most likely when the RCS is at operating pressure and temperature, which occurs primarily in Modes 1, 2, and 3. Mis-alignment issues, also referred to as loss of inventory events, occur most frequently in the upper end of Mode 5 when RCS cooling is transitioned from the DHR to the SGs.

Contributors to small LOCAs by mode:

- Mode 1: RCS pipe breaks, stuck open safety valves or PORV, random failures of RCP seals
- Mode 2: RCS pipe breaks, random failures of RCP seals
- Mode 3: RCS pipe breaks, random failures of RCP seals
- Mode 4: Mis-alignment issues due to RCS/ DHR valve realignment
- Mode 5: Mis-alignment issues due to switch from DHR cooling to SG cooling and RCS/ DHR valve realignment

The frequency of a small LOCA is expected to be lower in Modes 2 and 3, than in Mode 1 since consequential LOCAs are not expected to occur in Modes 2 and 3. The frequency of a loss of inventory event (mis-alignment issue) in Mode 4 and 5 has been seen to be a significant contributor to plant risk.

<u>RCP Seal LOCAs (loss of seal cooling):</u> RCP seal LOCAs resulting from loss of seal cooling due to complete failure of component cooling water or service water are most likely when the RCS temperature and pressure is high, which occurs in Mode 1, 2, and 3. In the lower modes, the RCS temperature is lower so the seals would not be subject to the high temperatures. In addition, the RCS pressure is significantly reduced in the lower operating modes.

<u>Transients Leading to Inadequate Primary-to-Secondary Heat Transfer (P-S HT):</u> These transients generally include such events as loss of MFW and turbine trip. The turbine is only operating in Mode 1. For other transients in this category, initiating event frequencies for Modes 2, 3 and 4 would be no greater than those for Mode 1.

<u>Loss of Decay Heat Removal:</u> Loss of decay heat removal is applicable to Modes 2 through 6. Decay heat is being removed by the MFW/condensate systems in Modes 2, 3, 4 and the upper part of Mode 5. DHR by the DHR system is in effect in Mode 5 and 6. DHR during mid-loop operations occurs in Mode 5. Due to low RCS level during mid-loop operations, increased frequency of loss of the DHR system due to DHR pump suction vortexing is a concern. Transition from the DHR system to P-S HT can lead to increased frequency of loss of DHR due to inappropriate isolation of DHR system piping before P-S HT is established.

<u>Loss of Offsite Power:</u> This event is applicable to all modes of operation. If work is ongoing in the switchyard, there is an increased probability of a loss of offsite power, otherwise the event frequency is the same in each mode. Typically, work in the switchyard occurs in the lower modes and not in Mode 1.

<u>Steam Generator Tube Ruptures:</u> Steam generator tube ruptures are of concern when there is a high pressure difference across the steam generator tubes. This occurs when the RCS is at a high pressure and the secondary side is at normal operating pressure or lower. This event is of interest

in Modes 1, 2, 3, and the upper end of Mode 4. There is no significant difference in event frequency between these modes.

Secondary Side Breaks: Secondary side breaks are of concern when the secondary side is at pressure, which is in Modes 1, 2, 3, and 4. There is no significant difference in event frequency between these modes.

Cold Overpressurization: Cold overpressurization[1] (designated low temperature overpressure (LTOP) for B&W plants) is of greatest interest when the RCS is water solid (B&W-designed plants do not operate in this mode). For B&W-designed plants cold overpressurization, i.e., LTOP, measures are delineated when T_{cold} is ≤ [plant specific temperature]. The event frequency for such cold overpressurization events is deemed insignificant. In response to various NRC generic letters, most B&W plants implemented an LTOP system based on a dual setpoint PORV. In addition, administrative controls were implemented to provide the operator a 10-minute mitigation response time if an LTOP event was to occur and the PORV failed (Reference 4). This 10-minute time response is possible largely because B&W plants do not operate in a water solid state, the condition where low temperature overpressure is most probable.

ATWS: The ATWS event is only of concern when the reactor is at power. In Modes 3-6 the reactor is at 0% power with most or all control rods inserted; therefore, ATWS is not possible. In Mode 2 the initial power level is less than 5%, and the high RCS pressures associated with an ATWS event will not occur. Therefore, this event is of primary interest in Mode 1.

Rod Withdrawal: Rod withdrawal events can occur anytime the rods are inserted into the core and the reactor trip breakers are closed. This situation can occur in Modes 1, 2, 3, 4 and 5. Rod withdrawal event frequencies for all Modes are considered to be no greater than those associated with Modes 1 and 2.

Boron Dilution: The boron dilution event is of interest in all modes of operation and results primarily from lower boron concentration makeup being returned to the RCS related to malfunctions of the makeup system. Criticality caused by boron dilution events during lower mode operations does not appear to be a significant contributor to PWR risk. Such events that could occur during shutdown were analyzed by NSAC-183 (Reference 5). An historical data search associated with this analysis found no occurrence of a boron dilution initiated reactivity excursion that caused inadvertent criticality, a necessary precursor to core damage. The analysis included both gradual and rapid boron dilution events. Based on this, lower mode boron dilution risk is considered to be no more than that associated with Mode 1 and 2.

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1 The NRC initiated with Generic Issue (GI) 94, "Additional Low-Temperature Overpressure Protection for Light-Water Reactors," Pursuant to 10 CFR 50.54(f), an evaluation of the need for additional LTOP protection. A regulatory analysis for GI 94 was prepared based on the results reported in NUREG-1326 (Reference 3). NUREG-1326 indicated that B&W plants do not operate in a water solid state and that no low temperature overpressure events have occurred at B&W plants; therefore, B&W plants were excluded from the analysis. It is worth noting that NUREG-1326 estimates, for non-B&W-designed PWRs, a frequency of core damage due to a through-wall crack (or vessel failure) to be $6x10^{-16}$/hour for a PWR in RHR with a bubble in the PZR. If B&W plants had been analyzed and the 10-minute operator response period invoked, this frequency would have been reduced, most likely to a small enough fraction as to have no real meaning.

3.4 Key Events

The following discussion addresses key events and plant perturbations that could lead to a higher risk level in the lower modes of plant operation compared to the risk level for at-power operation. This discussion includes, where relevant, reasons why included plant perturbations will not increase initiating event frequencies.

Mode 5

The initiating events of interest in Mode 5 are loss of inventory, loss of DHR, loss of offsite power, boron dilution, rod withdrawal and RCS low temperature overpressure. The key activities in this mode address maintaining DHR during mid-loop operations and during transition from DHR system cooling to P-S HT, and prevention of RCS inventory loss due to inadvertent draindown. Hence, the events of concern in Mode 5 are loss of DHR and RCS inventory loss.

For loss of DHR, higher frequencies occur during mid-loop operations (low RCS level induced vortex issue) and transition to P-S HT (inappropriate DHR system isolation during RCS pressure increase to start RCPs). Regarding the loss of inventory event (due to valve mis-alignments), it has been shown to contribute significantly to shutdown risk. Because of these considerations, it is important to have the DHR[2] system available to provide core cooling and RCS makeup when entering Mode 5. Once transition has been made to P-S HT, there needs to be a SG feed source and steam relief path. SG feed during plant startup in the lower modes is available from multiple separate condensate system trains (some plants also have additional SG feed systems available). ADVs are considered to be no more important in this Mode than in Mode 1.

Other than these areas of concern, there are no significant perturbations that lead to increased event frequencies. While low temperature overpressure may be a concern during a plant perturbation, adequate operator response time exists to respond to such upsets, even if the overpressure devices fail. This is because of administrative controls placed on makeup system availability and PZR level, and because B&W designed plants do not operate in a water solid mode. LTOP restrictions are implemented in Mode 4 during cooldown when cold leg temperature decreases below a certain value; these restrictions remain in effect as long as cold leg temperature is below this value. LTOP restrictions prohibit operation of the HPI system.

Mode 4

The initiating events of interest in Mode 4 are loss of inventory, loss of DHR, loss of offsite power, boron dilution, rod withdrawal, RCS low temperature overpressure and secondary side breaks. The key activities in Mode 4 involve increasing RCS temperature and preventing RCS inventory loss due to inadvertent draindown. The loss of inventory events have been shown to contribute significantly to risk during shutdown operations. To reduce this risk, it is important to ensure the DHR[2] (LPI) system is available to supply coolant for inventory control. SGs are fed

[2] DHR and Low Pressure Injection (LPI) are essentially the same systems. When aligned as DHR, the system provides core cooling via heat exchangers to the plant's ultimate heat sink. When aligned as LPI, the system adds inventory to the RCS. Having DHR available means one train is operable per STS: one train is operable as an Emergency Core Cooling System train, if during DHR operations it can be manually realigned to the LPI mode.

by multiple separate condensate systems (some plants also have additional SG feed systems available). ADVs are considered to be no more important in this Mode than in Mode 1. This assessment assumes transition of core cooling from the DHR system to the SGs occurs in Mode 5. However, depending upon the length of the outage, it can also occur in Mode 4. For this reason, DHR[2] should be available prior to SG operations.

Other than these areas of concern, there are no significant perturbations that lead to increased event frequencies. While low temperature overpressure may be a concern during a plant perturbation, adequate operator response time exists to respond to such upsets, even if the overpressure devices fail. This is because of administrative controls placed on makeup system availability and PZR level, and because B&W-designed plants do not operate in a water solid mode. LTOP restrictions are implemented in Mode 4 during cooldown when cold leg temperature decreases below a certain value; these restrictions remain in effect as long as cold leg temperature is below this value. LTOP restrictions prohibit operation of the HPI system.

<u>Mode 3</u>

The initiating events of interest in Mode 3 are loss of coolant events, loss of DHR, loss of offsite power, boron dilution, rod withdrawal events, SG tube rupture and secondary side breaks. The key activities in Mode 3 involve increasing RCS temperature and pressure. Event risks are less than those associated with at-power conditions due to the lower decay heat levels associated with a plant shutdown. Initiating event frequencies for LOCAs and secondary side breaks are considered to be less than at-power because RCS and SG pressures are at operating values for only a part of the time the plant is in this mode. Initiating event frequencies for all other potential events are approximately equal to or less than at-power and the same mitigation systems are available. SGs are fed by multiple separate condensate and MFW systems (some plants also have additional SG feed systems available). ADVs are considered to be no more important in this Mode than in Mode 1.

<u>Mode 2</u>

The initiating events of interest in Mode 2 are the same as those for at-power operation with the exception of loss of main feedwater, turbine trip, rod withdrawal events and ATWS. The key activities in Mode 2 involve increasing the reactor power level to less than 5%. The probability of and risk from most events are the same or less than when at-power since the decay heat level will be lower. The initiating event frequencies for the potential events are approximately equal to or less then when at power, and the same mitigation systems are available. SGs are fed by multiple separate condensate and MFW systems (some plants also have additional SG feed systems available). ADVs are considered to be no more important in this Mode than in Mode 1.

<u>Mode 1</u>

The initiating events of interest in Mode 1 are provided on Table 3. The key activities in Mode 1 involve increasing reactor power level above 5% and bringing the turbine on-line. These activities can lead to an increase in frequency of loss of feedwater; hence, it is important to have EFW available when entering Mode 1.

Modes 5-1 Offsite Power Considerations

Operation in the lower modes offers a higher potential for loss of offsite power if there are activities ongoing in the switchyard as the plant is being brought up in modes. With deregulation it is speculated that the grid stability may be degraded with power plants offline. Since there may be an increased dependence on the emergency diesel generators (EDGs)[3] to supply the required electrical power when the plant is offline, the EDGs should be available prior to changing modes.

3.5 System Importance

When an initiating event occurs following a shutdown, the only energy that needs to be removed from the RCS is decay heat and any thermal energy stored in RCS components, i.e., as a result of partial RCS heatup prior to event initiation. This contrasts dramatically with full power assessment plant states that can require full power energy to be removed from the fuel without the benefit of normal heat removal processes. Because of this, at-power assessments can indicate very rapid RCS inventory depletion, RCS depressurization (or pressurization), RB pressurization and ultimately core degradation rates. On a relative basis, such rates of change are not possible with the assumed decay heat levels, and RCS pressure and temperatures associated with Modes 5, 4, 3, and 2. Therefore, available mitigation systems are expected, via operator action, to be able to mitigate initiating events associated with the various modes during a plant startup following an outage.

Based on the foregoing discussion and the information included in sections 3.1, 3.2, 3.3, and 3.4, a determination can be made of what STS required systems are more important during lower modes than during at-power conditions (i.e., Mode 1). The systems of interest are those delineated by STS as required in the lower modes during startup and return to power operations. STS may require these systems when in a particular mode or to transition to a higher mode. The results of this determination are presented in Table 4.

4.0 SUMMARY

The objective of this evaluation is to perform a qualitative risk assessment that focuses on STS delineated systems required to be operable prior to changing modes during a return to power from a plant shutdown. Performance of the qualitative assessment is based on a return to power operations following a plant shutdown. The results of this assessment are presented in terms of STS required systems that are more important during Modes 5, 4, 3, and 2 than during at-power operations, i.e., Mode 1.

Systems deemed more important represent limitations on plant mode changes during startup following a plant shutdown. These systems are shown in Table 4.

3 Oconee uses two hydro-electric units rather than EDGs.

5.0 REFERENCES

1. NUREG-1430, "Standard Technical Specifications Babcock and Wilcox Plants, Revision 1," April 1995.

2. Industry/TSTF Standard Technical Specification Change Traveler, "Increased Flexibility in MODE Restraints," TSTF-359, Rev. 5.

3. NUREG/CR-6144, "Evaluation of Potential Severe Accidents During Low Power and Shutdown Operations at Surry, Unit 1, Volume 6 - Main Report," May 1995.

4. FTI Doc. No. 47-1172061-00 (BAW-2059), "Reactor Vessel Integrity - Pressure/Temperature Limits," VanScooter, et. al., November 1988.

5. NSAC-183, "Risk of PWR Inadvertent Criticality During Shutdown and Refueling," December 1992.

Table 1
Key Plant Parameters by STS Mode

Basis	Parameter	Mode 6 Refueling	Mode 5 Cold Shutdown	Mode 4 Hot Shutdown	Mode 3 Hot Standby	Mode 2 Startup	Mode 1 Power
STS Required[1]	RCS T_{ave} (°F)	NA	≤ 200	330 > T_{ave} > 200	≥ 330	NA	NA
	% Thermal PWR	NA	NA	NA	NA	≤5%	>5%
	Reactivity (k_{eff})	NA	< 0.99	< 0.99	< 0.99	≥ 0.99	≥ 0.99
Expected operational conditions[2]	RCS T_{ave} (°F)	≤ 140	> 140 to < 200	200 to < 330	330 to 532	549	582
	RCS Pressure (psig)	0	0 to ~250	~250 to ~750	~750 to ~2155	~2155	~2155
	SG Pressure (psig)	0	0 to vacuum	vacuum to ~85	~85 to ~885	~885	~885

Notes:
1. This information is from NUREG 1430, Standard Technical Specifications Babcock and Wilcox Plants, Revision 1, April 1995.
2. This information is from Crystal River 3 operating procedures.

Table 2
Key System Status by STS Mode

System	Mode 6 Refueling	Mode 5 Cold Shutdown	Mode 4 Hot Shutdown	Mode 3 Hot Standby	Mode 2 Startup	Mode 1 Power
RCS Makeup and Letdown	Out of service	Establish function	In service	In service	In service	In service
RCPs Running	None	2 or 3	3	3 or 4	4	4
Reactor Trip Breakers	Open	Closed	Closed	Closed	Closed	Closed
DHR	In service	In service or in standby	Standby	Standby	Standby	Standby
PZR	Open to containment	Vented to waste gas system or N_2 overpressure or bubble	Bubble	Bubble	Bubble	Bubble
RBS	Out of service	Place in standby	Standby	Standby	Standby	Standby
EFW	Out of service	Make available	Standby	Standby	Standby	Standby
HPI	Out of service	Establish limited availability based on LTOP measures	Standby	Standby	Standby	Standby
LPI	Out of service	Out of service or in standby	Standby	Standby	Standby	Standby
CF	Out of service	Out of service	Out of service	Standby	Standby	Standby
LTOP	Establish function	In service	In service	Not required	Not required	Not required
High Flux Trip Reset to Low Setpoint	NA	Yes	Yes	Yes	Yes[2]	No
Source Range	Not Required[1]	Two channels in service	Two channels in service	Two channels in service	Two channels in service	Not required
Intermediate Range	Not required	Two channels in service[3]	Two channels in service[3]	Two channels in service[3]	Two channels in service	Not required
Power Range	Not required	Not required	Not required	Required	Required	Required

Notes:
1. Not required by STS, however, two channels of source range instruments are in service at all times when there is fuel in the RV. They are either those associated with the normal nuclear instruments or temporarily installed refueling detectors. These instruments provide alarms for evacuation of the reactor building and containment isolation if source range counts exceed a predetermined value.
2. Some plants re-instate the high flux trip setpoint in mode 2 after exit from the reactor protection system shutdown bypass.
3. When any control rod drive (CRD) trip breaker is in the closed position and the CRD system is capable of rod withdrawal.

Table 3
Initiating Events by STS Mode

Initiating Event	**Mode 6 Refueling**	**Mode 5 Cold Shutdown**	**Mode 4 Hot Shutdown**	**Mode 3 Hot Standby**	**Mode 2 Startup**	**Mode 1 Power**
Large LOCA[1]				x	x	x
Medium LOCA[1]				x	x	x
Small LOCA/Loss of Inventory[2]	x	x	x	x	x	x
RCP Seal LOCAs (loss of seal cooling)[3]				x	x	x
Loss of Main Feedwater				x	x	x
Turbine Trip						x
Loss of DHR	x	x	x	x	x	
Loss of Offsite Power	x	x	x	x	x	x
Cold Overpressurization		x	x			
SG Tube Rupture[4]				x	x	x
Secondary Side Breaks[5]			x	x	x	x
ATWS						x
Boron Dilution	x	x	x	x	x	x
Rod Withdrawal		x	x	x	x	x

Notes:
1. Large and medium LOCAs are not considered in Modes 4 and 5 since the RCS pressure is much smaller than in Modes 1, 2, and 3.
2. Small LOCAs/Loss of Inventory in Modes 4, 5, and 6 are primarily due to alignment issues and open valves, not pipe breaks or random failures of RCP seals.
3. RCP seal LOCAs are not considered in Modes 4, 5, and 6 since the RCS pressure and temperature are much less than in Mode 3.
4. SGTRs are not considered in Modes 4, 5, and 6 since the ΔP across the tubes ($P_{RCS} - P_{SG}$) is much smaller than in Mode 3.
5. Secondary side breaks are not considered in Modes 5 and 6 since the secondary side pressure is much smaller than in Modes 3 and 4.

Table 4
Results of B&WOG Systems "More" Important Assessment

To Enter Plant Operating Mode	Systems More Important[1]
5	DHR EDG [hydro-electric units for Oconee]
4	DHR EDG [hydro-electric units for Oconee]
3	EDG [hydro-electric units for Oconee]
2	EDG [hydro-electric units for Oconee]
1	EFW[2] EDG [hydro-electric units for Oconee]

Notes:

1. Includes systems supporting the operation of the systems listed in this column.
2. In Modes 5, 4, 3 and 2, EFW is not as important because of the availability of other multiple separate systems to supply feedwater to the SGs. Other systems include multiple condensate and main feedwater systems (some plants also have additional SG feed systems available).

ATTACHMENT 3
CEOG
Qualitative Risk Assessment for Relaxation of MODE Entry Restraints

CEOG COMBUSTION ENGINEERING OWNERS GROUP

CE NPSD-1207, Rev 0

Qualitative Risk Assessment for Relaxation of Mode Entry Restraints

CEOG Task 1181

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CE NPSD-1207, Rev 0

Qualitative Risk Assessment for Relaxation of Mode Entry Restraints

CEOG Task 1181
Final Report

January 2001

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TABLE OF CONTENTS

1.0 OBJECTIVE

This report provides a qualitative risk assessment to identify the higher risk significant systems/ components as a function of plant operational modes for CEOG PWRs. Components identified as high risk significant in the target mode are to be exempted from the proposed relaxation to LCO 3.0.4. This effort supports the industry-wide risk-informed TSTF initiative to relax mode entry restraints (TSTF-359).

2.0 BACKGROUND

Initiative 3 of the industry's Risk-Informed Technical Specification (RITS) Program addresses a global change to the Standard Technical Specifications that will allow mode changes to be made while relying on action statements to satisfy the requirements of the LCO. Currently, LCO 3.0.4 states "When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified conditions in the Applicability for an unlimited period of time." This restrictive requirement can delay plant startup as the plant expends considerable resources to expeditiously resolve startup issues that are risk insignificant or low risk. For example, a nearly completed maintenance activity can delay a mode change and adversely impact a utility's plan for plant startup and return to power operation. To resolve this concern, the industry has proposed, a change to LCO 3.0.4 that will allow mode changes to occur with equipment inoperable by allowing the plant to enter the applicable LCO action statement for that mode.

This proposal is based on the premise that most AOTs were developed for Mode 1 and pose an acceptable plant risk for action statement entries initiated at, or occurring at lower modes. The AOTs are believed to be conservatively short when lower mode operational conditions are considered. To ensure the proposed relaxation is properly applied, systems/components that are judged more important to lower mode operation are exempted from the change. Individual plants may include these systems/components when incorporating this change provided the mode changes are subject to a robust risk-informed assessment.

The industry developed a TSTF-359 (Standard Technical Specification Change Traveler, Reference 1) for this proposed change and provided it to the NRC for review and approval. The Traveler addressed the impact of this change on risk in a qualitative manner. As stated in the Traveler:

> *"A qualitative review of initiating event frequencies, considering lower MODE (2, 3 or 4 for PWRs, 2 or 3 for BWRs) accident mitigation features and the activities associated with the lower MODES was performed and the review indicates that this proposed change is reasonable and acceptable. Based on the review, systems/components were identified that would be more important or less important in non-MODE 1 operation based on initiating event. The review identified a small number of systems/components in which, based on an increased potential for a particular initiating event in the lower MODES, entry into a MODE of Applicability would potentially have a greater impact in MODES 2-4 than they would in MODE 1."*

The NRC provided the following comment from their review:

> *"The industry should provide the "qualitative review," mentioned under "Risk Discussion" in the submittal, for the staff's review. In addition, a systematic investigation of likely changes*

in Modes or other specified conditions of operation and a "feeling" for the associated risks could provide useful information to support an implementation approach for the proposed change. For example, such investigation may show that no detailed PRA models are needed to compare risks, including risks associated with "transition" modes of operation."

This document summarizes the results of a qualitative review of contributors to mode dependent risks. The "qualitative review" was based on the CEOG's work with the PRA model for the San Onofre Nuclear Generating Station performed to support the CEOG Risk-Informed End State Assessment (CE-NPSD-1186, Reference 2).

3.0 APPROACH

A qualitative assessment is used to identify the specific systems/components that are required to be available prior to specific mode transitions. In this assessment, consideration is given to events that are unique to the specific mode being entered or that have an increased probability of occurrence in the mode being entered, and the availability of required mitigation systems. The basis for this assessment is a qualitative comparison of lower mode operations to operation in Mode 1. For situations where Mode 1 risk issues dominate the need for the system/component, the Mode 1 AOTs will be conservative when the event occurs in a lower mode. The qualitative insights are supported by supplemental information contained in the CEOG Risk-Informed End State Assessment Topical Report (Reference 2).

The risk associated with at-power operation is well understood. After decades of modeling PSA aspects of power operation, reviews of alternative mode risks have identified that, as the plant transitions from "at power" to "shutdown", the importance of most TS systems decreases. However, a few TS systems increase in importance. The increased importance of these systems arises as a result of:

- Events unique to the mode of interest,
- The typical events in the mode of interest have an increased probability of occurrence, or
- The mode of interest has a reduced mitigation system capability.

For this assessment, only mode changes associated with returning to power are under consideration. Therefore, it is necessary to identify those TS systems/components that are more important in the lower modes so that they may be highlighted for special treatment.

It is assumed as part of this assessment that the existing mode specific TS for all equipment provides adequate guidance to the plant staff with regard to the allowed outage time of a single component. Furthermore, the associated risks of entry into the Action Statement are limited and acceptable. Thus, entry into a TS action statement for a single component outage will be acceptable when such an entry is performed in a manner consistent with the TS and 10CFR50.65 (a)(4) (Reference 3).

<u>3.1 RCS Parameters and Status of Key Systems</u>

The qualitative approach to identifying the more important lower mode systems/components requires an understanding of the plant conditions when entering and exiting the different modes. This includes the status of plant parameters and availability of event mitigation systems/components. Table 1 provides a summary of key Reactor Coolant System (RCS) parameters for each mode for a typical CE designed PWR.

Table 2 provides the status of selected key systems for the different modes. The table shows the status or availability of RPS/ESFAS actuation and event mitigation systems, and several key normal operating systems. The table is not a comprehensive list of all plant operating systems. The list is illustrative only. Support systems necessary for the proper functioning of major systems are assumed to be available and operable.

3.2 Key Activities in Progress

The following provides a summary of the typical key activities that are in progress when returning to power for the mode transitions. This is based on a typical Combustion Engineering plant.

The following mode changes are considered:

- Mode 6 to 5
- Mode 5 to 4
- Mode 4 to 3
- Mode 3 to 2
- Mode 2 to 1

Modes 6-5

- RCS cooling by Shutdown Cooling System (SCS).
- Pressurizer safeties and manways installed.
- Low Temperature Overpressure Protection (LTOP) is in service.
- RCS charging and letdown in service.
- RCP seal injection (Sys. 80 plants only) in service.
- SG levels established and being maintained in the normal band.
- Fully tension reactor vessel head closure bolts (This establishes the transition from Mode 6 to Mode 5).

Modes 5-4

- RCS fill and vent completed (for some CE designed PWRs RCS can be water solid at some point in Mode 5).
- Pressurizer bubble established.
- Establish/enable Engineering Safety Features Actuation Signals (ESFAS).
- RCS temperatures being increased to ~ 330 °F (transition to Mode 4 occurs when RCS temperature exceeds 200 °F).
- RCS loops filled, with SG available as an operable heat sink (requires operable AFW and steam release path).
- Both Diesel Generators (DG) available and in standby.
- RCS pressure being maintained at ~ 340 psig.
- RCS cooling by Shutdown Cooling System (SDC secured as RCS heat up to above 200 °F and SG heat sink is established).
- LTOP in service (Mode 5 and lower end of Mode 4) LTOP operation varies among plants.
- Containment spray and coolers are verified available.

- RCS heatup being controlled by Turbine Bypass Control System or ADVs.

Mode 4-3

- Steam Generators (SGs) chemistry being adjusted in preparation for startup.
- SDC system is isolated.
- LTOP system not in effect.
- AFW being used to feed SGs (Note: plants with electric feedwater pumps or condensate pumps may use them for startup instead of AFW).
- RCS temperatures being increased from ~ 330 °F to ~ 557 °F with pump heat (transition to Mode 3 occurs when RCS temperature exceeds 350 °F, specific temperature range may vary among plants).
- RCS pressure being raised from ~ 340 psig to ~ 2235 psig.
- SIAS and MSIS auto reset.

Mode 3-2

- Remaining RCPs started when RCS is greater than about 525 °F (Mode 3).
- Reactor trip breakers are closed (Mode 3).
- Shutdown and control banks are withdrawn (Mode 3).
- Power is less than 5% (Mode 2).

Mode 2-1

- Transfer from AFW to MFW (note that some plants may already be on MFW depending on their approach to plant startup) (Mode 1).
- Increase power (Mode 1).
- Bring turbine on-line (Mode 1).

3.3 Initiating Events

Table 3 provides a summary of the initiating events by mode. The following discusses the applicability of each initiating event in each mode.

Large LOCAs: Large LOCAs are due to RCS pipe breaks. These are most likely when the RCS is at operating pressure which occurs in Modes 1, 2 and 3. The frequency of occurrence is expected to be the same for each mode.

Medium LOCAs: Medium LOCAs are due to RCS pipe breaks, stuck open safety relief valves or Power Operated Relief Valves (PORVs). These are most likely when the RCS is at operating pressure which occurs in Modes 1, 2 and 3. The frequency of occurrence is expected to be the same for each mode. Stuck open safety valves or PORVs can occur as a result of transient events which lead to increased RCS pressures, such as, total loss of main feedwater and turbine trip.

Small LOCAs: Small LOCAs are due to RCS pipe breaks, random failures of RCP seals, or mis-aligned systems. Pipe breaks are most likely when the RCS is at operating pressure which occurs in Modes 1, 2 and 3, and the frequency of the pipe break contribution to the initiating event frequency is expected to be the same for each of these modes. Random failures of RCP seals are also most likely when the RCS is at operating pressure and temperature which occurs primarily in Modes 1, 2 and 3. A successful response to breaks in the small break LOCA size range requires availability of steam generator heat removal.

Mis-alignment issues that can lead to LOCAs (also referred to as loss of inventory events) occur most frequently in the lower end of Mode 4 when the RCS cooling is switched between Shutdown Cooling heat removal via the SDC system and SG heat removal.

Contributors to small LOCAs by mode:

- Mode 1: RCS pipe breaks, random failures of RCP seals.
- Mode 2: RCS pipe breaks, random failures of RCP seals.
- Mode 3: RCS pipe breaks, random failures of RCP seals.
- Mode 4: Mis-alignment issues related to Shutdown Cooling System.
- Mode 5: Mis-alignment issues related to Shutdown Cooling System.

<u>RCP Seal LOCAs (loss of seal cooling, System 80 only):</u> RCP seal LOCAs due to random mechanical failure of seals are considered as small LOCA. Induced RCP seal LOCAs may arise resulting from loss of seal cooling due to complete failure of component cooling water or service water. Seal failure is most likely when the RCS temperature and pressure are high and the RCP is operating. This occurs in Mode 1, 2 and 3. In Modes 4, 5 and 6 the RCS temperature is sufficiently low that the seals would not be subject to thermal temperature challenges. In addition, the RCS pressure is significantly reduced in the lower operating modes, so the ability to mitigate the event is enhanced

<u>General Transients:</u> The general transients group includes loss of feedwater and turbine trip events. These events primarily occur when the reactor is at a power level greater than 5% in Mode 1. At power levels less than 5%, the main feedwater system may or may not be operating and the turbine is not operating.

<u>Loss of Decay Heat Removal:</u> Decay heat removal may be accomplished in Modes 2-5. Several means exist to remove decay heat. Two primary mechanisms for decay heat removal the SGs and the shutdown cooling system. Steam generators are used to remove decay heat using AFW and TBV's or ADVs in Modes 2 and 3, and the upper part of Mode 4. For some plants, MFW may support heat removal in theses modes as well. Shutdown Cooling decay heat removal is in effect in the lower part of Mode 4, and Modes 5 and 6. When entering Mode 5 from Mode 6 the RCS is depressurized and RCS loops may not be filled. Reduced inventory availability may lead to lower NPSH margin and an increased potential for loss of decay heat removal.

<u>Loss of Offsite Power:</u> This event is applicable to all modes of operation. If work is ongoing in the switchyard, there is an increased probability of a loss of offsite power event, otherwise the event frequency is the same in each mode. Typically, work in the switchyard occurs in the lower modes and not in Mode 1. At lower modes (Modes 4, 5 and 6) LOOP is particularly problematic as most plants are designed such that <u>all</u> heat removal mechanisms require electrical power.

<u>Steam Generator Tube Ruptures:</u> Steam generator tube ruptures are of concern when there is a high pressure difference across the steam generator tubes. This occurs when the RCS is at a high pressure and the secondary side is at normal operating pressure or lower. This event is of interest in Modes 1, 2, 3 and the upper end of Mode 4 prior to reducing the RCS pressure. There is no significant difference in event frequency between these modes.

Secondary Side Breaks: Secondary side breaks are of concern when the secondary side is at normal operating pressure which is in Modes 1, 2 and 3. There is no significant difference in event frequency between these modes. The impact of secondary side breaks in Mode 4 is reduced as the secondary temperature is typically less below 350 F (saturation pressure at 350 F is about 135 psia).

Cold Overpressurization: Cold overpressurization is of greatest interest when the RCS is water solid. This occurs during Mode 5 operation. For most plants, cold overpressurization is also of interest in Mode 4.

ATWS: The ATWS event is only of concern when the reactor is at power. In Modes 3 - 6 the reactor is at 0 power with the control rods inserted, therefore, ATWS is not possible. In Mode 2 the initial power level is less than 5%, and the high RCS pressure threat associated with an ATWS event will not occur, as the RCS has less stored energy than in Mode 1 and proportionally greater heat removal capacity. Therefore, this event is of primary interest in Mode 1.

Rod Withdrawal: Rod withdrawal events can only occur when the rods are in the core and the reactor trip breakers are closed. This situation can occur in Modes 1 - 3.

Boron Dilution: The boron dilution event is of interest in all modes of operation and results primarily from lower boron concentration makeup being returned to the RCS. This would likely be related to malfunctions of the CVCS or operator error.

3.4 Assessment of Mode Dependent Component Restrictions

Based on the previous information, the following assessments identify the key plant components, whose unavailability could lead to a higher risk level in the lower modes of plant operation This information is provided by plant mode.

Mode 5 Operation

The events of interest in Mode 5 are loss of inventory, loss of RCS heat removal, loss of offsite power, boron dilution and cold overpressurization. On initial entry into Mode 5 the RCS generally will be depressurized (loops may be filled or not filled). During midloop operation the potential for loss of decay heat removal is increased due to the reduced availability of NPSH margins for the SDC pumps. To reduce the risk from this event, the operators should be well trained on mid-loop operation and only one of the redundant trains of the Shutdown Cooling System should be operating at one time. Possible primary flow diversions due to valve realignments may result in inadvertent loss of coolant events. To minimize these risks, plant operation should be in accordance with the plant shutdown operations program plan. In this mode, the reactor vessel and RCS components are also susceptible to overpressurization failure due to loss of decay heat removal or spurious injection by HPSI. The cold overpressurization event is unique to Modes 5 and 4; it represents a risk not considered in the other modes. The LTOP system is designed to mitigate these challenges during low temperature operation.

Component Restrictions for entering Mode 5 using LCO 3.0.4 relaxation

Mode 5 risks are driven by loss of decay heat removal and, for water solid (or near solid conditions), spurious HPSI injection and unavailability of LTOP. Prior to entering Mode 5, both trains of the Shutdown Cooling System need to be available with one train in service, one EDG should be available (consistent with TS) , and the LTOP system is required to be in service.

Note that while HPSI is not required to be operable in Mode 5, shutdown practices typically recommend one train of HPSI be available to inject borated water into the RCS.

Mode 4 Operation

The events of interest in Mode 4 are loss of inventory, loss of decay heat removal, loss of offsite power, secondary side breaks, boron dilution, and cold overpressurization. The key activities in Mode 4 involve the switch, from Shutdown Cooling to SG heat removal and the increase in RCS temperature. During this switch the plant is susceptible to loss of RCS heat removal and loss of inventory events. The loss of inventory events due to Shutdown Cooling system mis-alignments, have been shown to contribute significantly to the risk of Mode 4 operation in shutdown PRA models. To reduce the risks from these two events it is important to ensure the appropriate mitigation systems are available. These include the AFW system to maintain heat removal and one HPSI Pump or the CVCS to supply coolant for inventory control. Low Temperature Overpressure Protection (LTOP) is also important in the lower end of Mode 4. The LTOP system is designed to mitigate excessive pressure at low temperature events.

Component Restrictions for entering Mode 4 using LCO 3.0.4 relaxation

In the low temperature end of Mode 4, LTOP is required to be in service. Many means exist to provide RCS heat removal in Mode 4. Standard operating guidance should be followed to ensure diverse and redundant heat removal paths are available. For shutdown cooling operation, entry into Mode 4 should not be made without availability of both trains of SDC or availability of two trains of AFW and support systems and steam relief paths. As a result of the possibility of reduced inventory in this mode and the potential for loss of inventory events during the mode 5 to 4 transition, the requirement for inventory control via availability of one train of HPSI (per LCO 3.5.3) should also be exempted from the LCO 3.0.4 relaxation. In the higher temperature end of Mode 4, use of the mode relaxation for AFW train inoperability should also be excluded.

Mode 3 Operation

The events of interest in Mode 3 are loss of coolant events, loss of decay heat removal, loss of offsite power, SG tube rupture, secondary side breaks and boron dilution. The key activities in Mode 3 involve the RCS temperature and pressure increase, and withdrawing the shutdown and control rods. The risk of from, most events are dependent on the core decay heat load. During startup, Mode 3 will have less risk than Mode 1 operation. This is likely since the decay heat level is lower during a startup from a lower mode than the decay heat level following a reactor trip. Also, initiating event frequencies are approximately equal to, or less than those in Mode 1, with most of the same mitigation capability. Unlike Mode 1, MFW may not be available in Mode 3. For most CE PWRs, in Mode 3 the plant is dependent on AFW for RCS heat removal, therefore, the availability of AFW is important. A degraded AFW system puts the plant into a more susceptible condition with regard to decay heat removal.

As in Mode 4, the ECCS technical specification only requires one train of HPSI for inventory control so long as the RCS pressure is below [1700 psia].

Component Restrictions for entering Mode 3 using the LCO 3.0.4 relaxation

A risk assessment prior to entering Mode 3 should ensure that adequate means exist to provide core/ RCS heat removal and inventory control. Prior to entering Mode 3, the AFW system and one train of the HPSI system are required to be available. This requirement also includes the associated support systems and associated steam relief paths required for the proper functioning of these systems. In addition, actuation signals to start the AFW system should be placed in service prior to switching RCS heat removal to the AFW system. As with Mode 4, the AFW system is of more risk importance in Mode 3 than in Mode 1. It is therefore recommended that without additional PSA assessments, the AFWS should be excluded from the LCO 3.0.4 relaxation. Furthermore, since inability to meet the HPSI system TS at lower RCS pressures will result in no HPSI injection capability Mode 3, it is recommended that this condition also be excluded from the LCO 3.0.4 relaxation.

As EDGs are important for providing emergency power to the required mitigating systems, the LCO 3.0.4 exemption is also extended to the plant EDGs.

<u>Mode 2 Operation</u>

The events of interest in Mode 2 are the same as those for at-power operation with the exception of loss of main feedwater (although loss of decay heat removal is applicable), turbine trip and ATWS. The key activities in Mode 2 involve increasing the reactor power level to less than 5%. The probability of, and risk from, events are the same or less than Mode 1. This is likely since the decay heat level is lower during a startup Mode 2, the initiating event frequencies for the potential events are approximately equal to or less than those in Mode 1, with both modes having the same mitigation systems available. In Mode 2 the plant may be dependent on AFW for RCS heat removal; therefore, the availability of AFW is important. A degraded AFW system puts the plant into a more susceptible condition with regard to decay heat removal.

Component Restrictions for entering Mode 2 using the LCO 3.0.4 relaxation

Prior to entering Mode 2, the AFW system is secured, but required to be available. This includes the associated support systems and actuation signals to start the AFW system. The AFW system is more risk significant in Mode 2 than in Mode 1. It is therefore recommended that without additional PSA assessments, the AFW system should be excluded from the LCO 3.0.4 relaxation. As EDGs are important for providing emergency power to the required mitigating systems, the LCO 3.0.4 exemption is also extended to the plant EDGs.

<u>Mode 1 Operation</u>

The events of interest in Mode 1 are provided on Table 3. The key activities in Mode 1 involve increasing the reactor power level to 100%, transferring from AFW to main feedwater (some plants may already be on MFW), and bringing the turbine on-line. These startup activities provide for an increased probability of loss of feedwater flow to the steam generators. During this phase of the startup, the plant is more dependent on AFW than when operating at steady-state conditions due to the increased potential for loss of feedwater or turbine trip. A degraded AFW system puts the plant into a more susceptible condition with regard to decay heat removal.

Component Restrictions for entering Mode 1 using the LCO 3.0.4 relaxation

Prior to entering Mode 1, the AFW system, associated support systems and actuation signals are required to be available. The AFW System provides decay heat removal capability for a wide range of plant upsets. It is therefore recommended that without additional PSA assessments, the AFWS should be excluded from the LCO 3.0.4 relaxation. As EDGs are important for providing emergency power to the required mitigating systems, the LCO 3.0.4 exemption is also extended to the plant EDGs.

<u>Comments on EDG Unavailability</u>

Operation in the lower modes offers a higher potential for loss of offsite power if there are activities ongoing in the switchyard. If such activities are in progress, then there is an increased plant dependence on the Emergency Diesel Generators (EDGs). Therefore, if there are activities ongoing in the switchyard, the risk assessments should consider the potential for increased loss of power events. While in any shutdown mode, standard plant practices for ensuring safe plant shutdown operation should be followed. The plant risk in shutdown modes will be managed consistent with the requirements of 10CFR50.65.

It should be noted that EDG restrictions discussed above are based on situations where the TS EDGs are the only source of emergency AC. Plants with alternate AC sources and/or plant cross-ties may have sufficient redundancy such that additional flexibility in relaxing mode restraints can be justified.

4.0 SUMMARY

An assessment of the components important to controlling risk in lower modes was performed. The results of this assessment identified several components which are not candidates for the proposed change and should be excluded from the LCO 3.0.4 relaxation. These components and their Mode limitations are identified in Table 4.

Note that components contained in Table 4 may be removed from the exclusionary list on a plant specific basis via use of RG 1.174. To secure this additional flexibility, a commitment to a pre-transition assessment will be required and the PSA methodology should be capable of estimating plant risks in Modes 4 and 5.

5.0 REFERENCES

1. Industry/TSTF Standard Technical Specification Change Traveler, "Increased Flexibility in MODE Restraints," TSTF-359, Revision 1.

2. CE-NPSD-1186, Revision 00, "Technical Justification for the Risk Informed Modification to Selected Required Action End States for CEOG PWRs," March 2000, Combustion Engineering, Inc.

3. 10CFR50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," July 10, 1996.

Table 1
Key Plant Parameters by Technical Specification Mode

Parameter	Mode 6	Mode 5	Mode 4	Mode 3	Mode 2	Mode 1
Average RCS Temperature	NA	≤ 200 °F	200 °F to 350 °F	≥ 350 °F	Normal Operating Temperature	Normal Operating Temperatures
Reactor Power Level	NA	NA	NA	NA	≤ 5%	> 5%
Reactivity Condition K_{eff}	NA	< 0.99	< 0.99	< 0.99	≥ 0.99	≥ 0.99
RCS Pressure	Atmospheric	Atmospheric	Min RCP NPSH to ~ 1500 psia	1500 psia to 2250 psia	~ 2250 psia	~ 2250 psia
Pressurizer Status	- open/vented to - closed/water solid	Closed/Water solid	Bubble	Bubble	Bubble	Bubble
Secondary Side Pressure	0 psig	0 psig	Operating pressure limited by RCS temperature	Normal Operating Pressure	Normal Operating Pressure	Normal Operating Pressure

Table 2
System Status by Technical Specification Mode

System	Mode 6	Mode 5	Mode 4	Mode 3	Mode 2	Mode 1
Charging and Letdown (CVCS)	Placed In Service before mode change	In service	In service	In service	In service	In service
Reactor Coolant Pumps	None running	As needed for plant heatup	As needed for plant heatup	All running	All running	All running
Shutdown Cooling System	In service	In service	In service or Isolated	Isolated	Isolated	Isolated
Auxiliary Feedwater	Out of service	Out of service	Aligned for startup	Aligned for startup or in standby	Aligned for startup or in standby	In standby
Low Pressure Safety Injection Pump	In Service*	In Service*	In Service or Standby	Standby	Standby	Standby
High Pressure Safety Injection Pump	Pull to lock (LTOP)	Pull to lock (LTOP)	Pull to lock (LTOP) Standby one train operable	Standby two trains operable above [1700 psia]	Standby two trains operable	Standby two trains operable
LTOP	Enabled	Enabled	Enabled (Below [275 °F])	Disabled	Disabled	Disabled
Log Power/Power Rate of change	Not required	Operable	Operable	Operable	Operable	Operable
RPS Matrix	Not required	Operable	Operable	Operable	Operable	Operable
RPS Trip Unit	Not required	Not required	Not required	Not required	Operable	Operable
ESFAS	Not required	Not required	Operable (Manual Actuation)	Operable	Operable	Operable
Emergency Diesel Generators	One EDG Operable	One EDG Operable	Operable (Two)	Operable (Two)	Operable (Two)	Operable (Two)

* To support SDC.

Table 3 Initiating Events by Technical Specification Mode						
Initiating Event	**Mode 1**	**Mode 2**	**Mode 3**	**Mode 4**	**Mode 5**	**Mode 6**
Large LOCA[1]	X	X	X			
Medium LOCA[1]	X	X	X			
Small LOCA/loss of inventory[2]	X	X	X	X	X	X
RCP Seal LOCAs (loss of seal cooling)[5]	X	X	X			
Loss of Main Feedwater	X					
Turbine Trip	X					
Loss of Decay Heat Removal[7]		X	X	X	X	X
Loss of Offsite Power	X	X	X	X	X	X
Cold Overpressurization				X	X	
SG Tube Rupture[3]	X	X	X			
Secondary Side Breaks[4]	X	X	X	X		
ATWS	X					
Boron Dilution	X	X	X	X	X	X
Rod Withdrawal[6]	X	X	X			

Notes:

1. Large and medium LOCAs are not considered in Modes 4, 5 and 6 since the RCS pressure is much lower than in Modes 1, 2 and 3.
2. Small LOCAs in Modes 4, 5 and 6 are primarily loss of inventory events due to alignment issues and open valves, not pipe breaks or random failures of RCP seals.
3. SGTRs are not considered in Modes 4, 5 and 6 since the delta P across the tubes (P_{RCS} - $P_{secondary\ side}$) is much lower than in Mode 3.
4. Secondary side breaks are not considered in Modes 5 and 6 since the secondary side pressure is much lower than in Modes 3 and 4.
5. RCP seal LOCAs are not considered in Modes 4, 5 and 6 since the RCS pressure and temperature are much less than in Mode 3. SGTRs have also been excluded from Mode 4 since the expected SGTR pressure difference is less than that at power.
6. Rod withdrawal is not considered in Modes 5 and 6 since the reactor trip breakers are open.
7. Loss of MFW is applicable to plants that start up on MFW. In this case, this event is the same as the Loss of Decay Heat Removal event.

Table 4
Candidate Systems and Components Exempted from 3.0.4 Relaxation

System/Component	MODE 2 (Startup)	MODE 3 (Hot Standby)	MODE 4 (Hot Shutdown)	MODE 5 (Cold Shutdown)
SDC*	Component Not Required	Component Not Required	Component Not Required	Relaxation Not Allowed
LTOP/PORVs (when used for LTOP)	Component Not Required	Component Not Required	Component Not Required above Set Temperature otherwise relaxation not allowed	Relaxation Not Allowed
EGD*	Relaxation Not Allowed	Relaxation Not Allowed	Relaxation Not Allowed	Relaxation Not Allowed
RPS	Relaxation Not Allowed	Component Not Required	Component Not Required	Component Not Required
HPSI and LPSI	Relaxation Allowed	Relaxation allowed above [1700 PSIA] only Otherwise Relaxation Not Allowed	Relaxation Not Allowed	Component Not Required
AFW/EFW*	Relaxation Not Allowed	Relaxation Not Allowed**	Relaxation Not Allowed**	Component Not Required

* Support systems required for operability.
** Restricted relaxation may be allowed based on results of PSA risk assessments.
\+ There is an expectation that one train of HPSI be available.

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ATTACHMENT 4
WOG
Qualitative Risk Assessment Supporting Increased Flexibility
in
MODE Restraints

QUALITATIVE RISK ASSESSMENT SUPPORTING INCREASED FLEXIBILITY IN MODE RESTRAINTS

WOG Program: Risk-Informed Technical Specifications Improvements
MUHP-3015

January 2002

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ACRONYMS

AFW	-	Auxiliary Feedwater
ATWS	-	Anticipated Transient Without Scram
BWR	-	Boiling Water Reactor
CEOG	-	Combustion Engineering Owner Group
CCP	-	Centrifugal Charging Pump
CVCS	-	Chemical and Volume Control System
DG	-	Diesel Generator
EDG	-	Emergency Diesel Generator
FW	-	Feedwater
HFASA	-	High Flux At Shutdown Alarm
LOCA	-	Loss of Coolant Accident
LCO	-	Limiting Condition for Operation
MFW	-	Main Feedwater
PORV	-	Power Operated Relief Valve
PRA	-	Probabilistic Risk Assessment
PWR	-	Pressurized Water Reactor
PZR	-	Pressurizer
RCP	-	Reactor Coolant Pump
RCS	-	Reactor Coolant System
RHR	-	Residual Heat Removal
SG	-	Steam Generator
SGTR	-	Steam Generator Tube Rupture
SI	-	Safety Injection
SLI	-	Steamline Isolation
SSPS	-	Solid State Protection System
RITS	-	Risk-Informed Technical Specifications
TSTF	-	Technical Specification Task Force

1.0 Objective

Provide the qualitative risk assessment to identify the systems/components required to be available prior to changing modes during plant startup to power operation.

2.0 Background

Initiative 3 of the industry's Risk-Informed Technical Specification (RITS) Program addresses a global change to the Standard Technical Specifications that will allow Mode changes to be made while relying on Action statements to satisfy the requirements of the LCO. Currently, LCO 3.0.4 states "When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified conditions in the Applicability for an unlimited period of time." This restrictive requirement can delay the startup of a plant and in many situations it is overly restrictive. A nearly completed maintenance activity can delay a mode change and adversely impact a utility's plan for plant startup and return to power operation. A mode change is prohibited by the Technical Specifications, except as noted above, with certain equipment inoperable even though once in the mode of interest or at-power the plant may be able to operate for a limited period with the same equipment inoperable. This proposed change will allow mode changes with equipment inoperable consistent with the applicability of that mode.

The industry developed TSTF-359 (Standard Technical Specification Change Traveler, Reference 1) for this proposed change and provided it to the NRC for review and approval. The Traveler addressed the impact of this change on risk in a qualitative manner. As stated in the Traveler:

> *"A qualitative review of initiating event frequencies, considering lower MODE (2, 3, or 4 for PWRs, 2 or 3 for BWRs) accident mitigation features and the activities associated with the lower MODES was performed and the review indicates that this proposed change is reasonable and acceptable. Based on the review, systems/components were identified that would be more important or less important in non-MODE 1 operation based on initiating event. The review identified a small number of systems/components in which, based on an increased potential for a particular initiating event in the lower MODES, entry into a MODE of Applicability would potentially have a greater impact in MODES 2-4 than they would in MODE 1."*

The NRC provided the following comment from their review:

> *"The industry should provide the "qualitative review", mentioned under "Risk Discussion" in the submittal, for the staff's review. In addition, a systematic investigation of likely changes in Modes or other specified conditions of operation and a "feeling" for the associated risks could provide useful information to support an implementation approach for the proposed change. For example, such investigation may show that no detailed PRA models are needed to compare risks, including risks associated with "transition" modes of operation."*

The "qualitative review" was based on the CEOG's work with the PRA model for the San Onofre Nuclear Generating Station. Its applicability to plants for the other Owners Groups is not specified or discussed in the Traveler. To resolve this issue, the industry agreed to provide the NRC the requested "qualitative review" for each Owners Group.

3.0 Approach

A qualitative assessment was used to identify the specific equipment that is required to be available prior to specific mode transitions. In this assessment, consideration is given to events that are unique to the specific mode being entered or that have an increased probability of occurrence in the mode being entered, and the availability of required mitigation systems. The basis for this assessment is a qualitative comparison to at-power plant operation in Mode 1. The risk from at-power operation is well understood, and generally associated with the highest level of plant risk, therefore, operation in the lower modes with equipment unavailable should not be more limiting than operation in Mode 1 unless:

- there are unique events to the mode of interest,
- the typical events in the mode of interest have an increased probability of occurrence, or
- the mode of interest has a reduced mitigation system capability.

For this assessment, it is necessary to understand the key plant changes that occur during the mode changes so it is possible to identify the initiating events that can occur and systems available for event detection, actuation, and mitigation.

The following mode changes are considered:

- Mode 6 to 5
- Mode 5 to 4
- Mode 4 to 3
- Mode 3 to 2
- Mode 2 to 1

3.1 RCS Parameters and Status of Key Systems

The qualitative approach requires an understanding of the plant conditions when entering and exiting the different modes. This includes the status of plant parameters and availability of event mitigation systems. Table 1 provides a summary of the important reactor coolant system (RCS) parameters for the different mode transitions. This table also provides the Tech Spec temperatures and power levels specified for the different modes. Only mode changes when returning to power are under consideration.

Table 2 provides the status of the key systems for the different modes. This shows the status or availability of the primary event actuation and mitigation systems, and several key normal operating systems. This table is not a comprehensive list of plant operating or standby systems nor is it intended to be such a list. The support systems for these systems are also required.

3.2 Key Activities in Progress

The following provides a summary of the typical key activities that are in progress when returning to power for the mode transitions. This is based on a typical Westinghouse plant.

<u>Modes 6-5</u>
- Install pressurizer safeties and manways (Mode 6)
- RCS fill and vent (Mode 6)
- Establish RCS charging and letdown (Mode 6)
- Establish RCS seal injection flow (Mode 6)
- Establish cold overpressure protection (Mode 6) (RCS will be water solid at some point in Mode 5)

- Lower steam generator (SG) levels (Mode 6)
- Increase RCS temperature from ~130^{o}F to ~185^{o}F (transition to Mode 5 occurs when RCS temperature exceeds 140^{o}F, per the Improved Tech Specs transition to Mode 5 occurs when the RCS temperature is >200^{o}F and all head closure bolts are fully tensioned)
- Increase RCS pressure from open-to-containment to ~340 psig
- RCS cooling by residual heat removal (RHR) system (Modes 6 and 5)

Modes 5-4
- Establish pressurizer bubble (Mode 5) (RCS will be water solid at some point in Mode 5)
- Place centrifugal charging pumps (CCP) in standby after bubble established (Mode 5)
- Place solid state protection system (SSPS) in service (Mode 5)
- Increase RCS temperature from ~185^{o}F to ~330^{o}F (transition to Mode 4 occurs when RCS temperature exceeds 200^{o}F)
- Verify auxiliary feedwater (AFW) aligned for startup (Mode 4)
- Maintain RCS pressure at ~340 psig
- RCS cooling by RHR (Mode 5 and lower end of Mode 4)
- Cold overpressure protection in service (Mode 5 and lower end of Mode 4)

Mode 4-3 (lower end of mode 4 on RHR, then switch to AFW)
- Prepare SGs for startup (Mode 4)
- Restore AFW actuation signals and AFW components for automatic actuation (Mode 4)
- Place RHR system in standby (lower end of Mode 4)
- Block cold overpressure protection system (Mode 4)
- Initiate AFW (note that at some plants, a startup feedwater pump or condensate pumps and main feedwater (MFW) may be used for startup instead of AFW) (Mode 4)
- Increase RCS temperature from ~330^{o}F to ~557^{o}F (transition to Mode 3 occurs when RCS temperature exceeds 350^{o}F)
- Increase RCS pressure from ~340 psig to ~2235 psig
- Start remaining RCPs (Mode 3)
- Verify pressurizer (PZR) pressure safety injection (SI) and steamline pressure SI and steamline isolation (SLI) auto reset (Mode 3)
- RCS heatup controlled by condenser steam dumps and SG atmospheric relief valves

Mode 3-2
- Close reactor trip breakers (Mode 3)
- Withdraw shutdown and control banks (Mode 3)
- Raise power to less than 5% (Mode 3 to 2)

Mode 2-1
- Transfer from AFW to MFW (note that some plants may already be on MFW depending on their MFW design and approach to plant startup) (Mode 1)
- Increase power (Mode 1)
- Bring turbine on-line (Mode 1)

3.3 Initiating Events

Table 3 provides a summary of the initiating events by mode. The following discusses the applicability of each initiating event in each mode.

Large LOCAs: Large LOCAs are due to RCS pipe breaks. These are most likely when the RCS is at operating pressure which occurs in Modes 1, 2, and 3. The frequency of occurrence is expected to be the same for each mode.

Medium LOCAs: Medium LOCAs are due to RCS pipe breaks. These are most likely when the RCS is at operating pressure which occurs in Modes 1, 2, and 3. The frequency of occurrence is expected to be the same for each mode.

Small LOCAs: Small LOCAs are due to RCS pipe breaks, stuck open safety valves or power operated relief valves (PORV), random failures of RCP seals, or mis-aligned systems. Pipe breaks are most likely when the RCS is at operating pressure which occurs in Modes 1, 2, and 3, and the frequency of the pipe break contribution to the initiating event frequency is expected to be the same for each of these modes. Stuck open safety valves or PORVs can occur as a result of transient events which lead to increased RCS pressures, such as, total loss of main feedwater and turbine trip. These are Mode 1 events (the plant is on main feedwater with the turbine operating only in Mode 1). Random failures of RCP seals are also most likely when the RCS is at operating pressure and temperature which occurs primarily in Modes 1, 2, and 3. Mis-alignment issues that can lead to LOCAs (also referred to as loss of inventory events) occur most frequently in the lower end of Mode 4 when the RCS cooling is switched between the RHR system and AFW.

Contributors to small LOCAs by mode:

- Mode 1: RCS pipe breaks, stuck open safety valves or PORVs, random failures of RCP seals
- Mode 2: RCS pipe breaks, random failures of RCP seals
- Mode 3: RCS pipe breaks, random failures of RCP seals
- Mode 4: Mis-alignment issues due to switch between RHR and AFW
- Mode 5: Mis-alignment issues related to RHR cooling (lower frequency than for Mode 4).

The frequency of a small LOCA is expected to be lower in Modes 2 and 3, than in Mode 1 since consequential LOCAs are not expected to occur in Modes 2 and 3. The frequency of a small LOCA, or loss of inventory event, in Mode 4 has been seen to be a significant contributor to plant risk. The frequency of a small LOCA in Mode 5 is expected to be lower than in Mode 4 since RHR cooling is already established in Mode 5 and mis-alignment issues reduced.

RCP Seal LOCAs (loss of seal cooling): RCP seal LOCAs resulting from loss of seal cooling due to complete failure of component cooling water or service water are most likely when the RCS temperature and pressure are high. This occurs in Mode 1, 2, and 3. In the lower modes the RCS temperature is lower so the seals would not be subject to the high temperatures. In addition, the RCS pressure is significantly reduced in the lower operating modes.

General Transients: The general transients group includes loss of main feedwater and turbine trip events. As previously noted some plants use condensate pumps and MFW to return to power. These events can primarily occur when the reactor is at a power level greater than 5% in Mode 1. At power levels less than 5%, the main feedwater system may or may not be operating and the turbine is not online.

Loss of Decay Heat Removal: Loss of decay heat removal is applicable to Modes 2-6. Decay heat is being removed by the AFW system (or possibly the startup feedwater systems and condensate pumps and MFW) in Modes 2 and 3, and the upper part of Mode 4. RHR decay heat removal is in effect in the lower part of Mode 4, and Modes 5 and 6. In Mode 4, the switch between RHR cooling and AFW can lead to an increased frequency of occurrence of this event. When entering Mode 5 from Mode 6 the RCS is depressurized and RCS loops may not be filled. Under this situation there is an increased potential for loss of decay heat removal.

<u>Loss of Offsite Power:</u> This event is applicable to all modes of operation. If work is ongoing in the switchyard, there is an increased probability of a loss of offsite power event. Work in the switchyard usually occurs in the lower modes and not in Mode 1. In addition, with deregulation it is speculated that the grid stability may be degraded with power plants offline. Therefore, a loss of offsite power may become more likely when a plant is not online.

<u>Steam Generator Tube Ruptures:</u> Steam generator tube ruptures are of concern when there is a high pressure difference across the steam generator tubes. This occurs when the RCS is at a high pressure and the secondary side is at normal operating pressure or lower. This event is of interest in Modes 1, 2, 3, and the upper end of Mode 4 prior to reducing the RCS pressure. There is no significant difference in event frequency between these modes.

<u>Secondary Side Breaks:</u> Secondary side breaks are of concern when the secondary side is at normal operating pressure which is in Modes 1, 2, 3, and 4. There is no significant difference in event frequency between these modes.

<u>Cold Overpressurization</u>: Cold overpressurization is of greatest interest when the RCS is water solid. This occurs during Mode 5 operation. Cold overpressurization is also of interest in Mode 4.

<u>ATWS:</u> The ATWS event is only of concern when the reactor is at power. In Modes 3-6 the reactor is at 0 power with the control rods inserted, therefore, ATWS is not possible. In Mode 2 the initial power level is less than 5%, and the high RCS pressures associated with an ATWS event will not occur. Therefore, this event is of primary interest in Mode 1.

<u>Rod Withdrawal:</u> Rod withdrawal events can only occur when the rods are at least partially in the core and the reactor trip breakers are closed. This situation can occur in Modes 1-3.

<u>Boron Dilution</u>: The boron dilution event is of interest in all modes of operation and results primarily from lower boron concentration makeup being returned to the RCS related to malfunctions of the CVCS. There is no significant difference in event frequency between the modes.

3.4 Mode Entry Equipment Restrictions

Based on the previous information, the following are identified as the key events or plant perturbations, that could lead to a higher risk level in the lower modes of plant operation compared to the risk level for at-power operation. From this the limitations on equipment unavailability for mode entry is determined and provided. This information is provided by plant mode.

<u>Mode 5</u>

The events of interest in Mode 5 are loss of inventory, loss of RCS heat removal, loss of offsite power, dilution, and cold overpressurization. On initial entry into Mode 5 the RCS generally will be depressurized and loops not filled. Under these conditions the potential for loss of decay heat removal is increased. To reduce the risk from this event both trains of RHR should be available. There are no other significant plant perturbations that can impact plant safety in Mode 5 except for RCS overpressurization. The RCS is susceptible to cold overpressurization due to RCS temperature and potential water solid conditions. The cold overpressurization event is unique to Modes 5 and 4; it represents a risk not considered in the other modes. The cold overpressure protection system is designed to mitigate these events. This includes the associated support systems.

Limitation: Prior to entering Mode 5, both trains of RHR need to be available, with one train in service, and the cold overpressure protection system is required to be in service.

Mode 4

The events of interest in Mode 4 are loss of inventory, loss of decay heat removal, loss of offsite power, secondary side breaks, boron dilution, and cold overpressurization. The key activities in Mode 4 involve the switch from RHR cooling to AFW cooling (or to startup feedwater or condensate/main feedwater pumps) and the increase in RCS temperature. During this switch the plant is susceptible to loss of RCS heat removal and loss of inventory events. The loss of inventory events, due to RHR system mis-alignments, have been shown to contribute significantly to the risk of Mode 4 operation in shutdown PRA models. To reduce the risks from these two events it is important to ensure the appropriate mitigation systems are available. These include the AFW system to maintain heat removal and the high head safety injection system to supply coolant for inventory control. For plants starting up on startup FW or main FW, the AFW system is a backup system and represents one of several methods to provide for decay heat removal, therefore, AFW is not as important for heat removal. Cold overpressurization is also important in the lower end of Mode 4. The cold overpressurization protection system is designed to mitigate this event.

Limitations: Prior to entering Mode 4, the AFW system and the high head safety injection systems are required to be available. This includes the associated support systems. For plants not starting up on AFW, there are no AFW limitations for entering Mode 4. The cold overpressure protection system is also required to be in service.

Mode 3

The events of interest in Mode 3 are loss of coolant events, loss of decay heat removal, loss of offsite power, SG tube rupture, secondary side breaks, dilution, and rod withdrawal events. The key activities in Mode 3 involve the RCS temperature and pressure increase, and withdrawing the shutdown and control rods. The probability of and risk from most events are the same or less than at-power operation since the decay heat level is lower during a startup from a lower mode than the decay heat level following a reactor trip, the initiating event frequencies for the potential events are approximately equal to or less than those in Mode 1, and the same mitigation systems are available. The plant is dependent on AFW or startup FW or main FW, depending on the plant, for RCS heat removal. For plants starting up on startup FW or main FW, the AFW system is a backup system and represents one of several methods to provide for decay heat removal. For these plants AFW is no more important in Mode 3 than Mode 1. For plants dependent on AFW for startup, AFW is a more important system since it would also be called on to mitigate a failure of decay heat removal.

Limitations: For plants starting up on AFW, prior to entering Mode 3, the AFW system is required to be available. This includes associated support systems. For plants not starting up on AFW, there are no limitations for entering Mode 3.

Mode 2

The events of interest in Mode 2 are the same as those for at-power operation with the exception of loss of main feedwater (although loss of decay heat removal is applicable), turbine trip, and ATWS. The key activities in Mode 2 involve increasing the reactor power level to less than 5%. The probability of and risk from most events are the same or less than when at-power since the decay heat level is lower during a startup from a lower mode than the decay heat level following a reactor trip, the initiating event frequencies for the potential events are approximately equal to or less than those in Mode 1, and the same mitigation systems are available. The plant is dependent on AFW or startup FW or main FW, depending on the plant, for RCS heat removal. For plants starting up on startup FW or main FW, the AFW system is a backup system and represents one of several methods to provide for decay heat removal. For these plants AFW is no more important in Mode 2 than Mode 1. For plants dependent on AFW for startup, AFW is a more important system since it would also be called on to mitigate a failure of decay heat removal.

Limitations: For plants starting up on AFW, prior to entering Mode 2, the AFW system is required to be available. This includes associated support systems. For plants not starting up on AFW, there are no limitations for entering Mode 2.

Mode 1

The events of interest in Mode 1 are provided on Table 3. The key activities in Mode 1 involve increasing the reactor power level to 100%, transferring from AFW or startup feedwater to main feedwater (some plants may already be on MFW), and bringing the turbine on-line. These startup activities provide for an increased probability of loss of feedwater flow to the steam generators. During this phase of the startup, the plant is more dependent on AFW than when operating at steady-state conditions due to the increased potential for loss of feedwater or turbine trip. A degraded AFW system puts the plant into a more susceptible condition with regard to decay heat removal.

Limitations: Prior to entering Mode 1, the AFW system is required to be available. This includes the associated support systems.

Modes 1-5

Operation in the lower modes offers a higher potential for loss of offsite power if there are activities ongoing in the switchyard as the plant is being brought up in modes. With deregulation it is speculated that the grid stability may be degraded with power plants offline. Since there may be an increased dependence on the emergency diesel generators (EDGs) to supply the required electrical power when the plant is offline, the DGs should be available prior to changing modes.

Limitation: Prior to entering Modes 1, 2, 3, 4, and 5, the EDGs are required to be available. In addition, the associated support systems are required to be available.

4.0 Summary

A qualitative risk assessment was performed to identify systems/components that should be required to be available prior to changing modes during plant startup to power operation. These limitations are summarized on Table 4.

5.0 References

1. Industry/TSTF Standard Technical Specification Change Traveler, “Increased Flexibility in MODE Restraints”, TSTF-359, Rev. 1.

Table 1
Key Plant Parameters by Technical Specification Mode

Parameter	Mode 6 to Mode 5	Mode 5 to Mode 4	Mode 4 to Mode 3	Mode 3 to Mode 2	Mode 2 to Mode 1	Mode 1
Tech Spec RCS Temperature	NA (Mode 6, Refueling)	$\leq$ 200°F (Mode 5, Cold Shutdown)	>200°F to <350°F (Mode 4, Hot Shutdown)	$\geq$350°F (Mode 3, Hot Standby)	$\geq$350°F (Mode 2, Startup)	$\geq$350°F (Mode 1, Power)
Tech Spec Reactor Power Level	0% (Mode 6)	0% (Mode 5)	0% (Mode 4)	0% (Mode 3)	$\leq$5% (Mode 2)	>5% (Mode 1)
RCS Temperature	~130°F to ~185°F	~185°F to ~330°F	~330°F to ~557°F	~557°F	~557°F	~557°F
RCS Pressure	Containment to ~340 psig	~340 psig	~340 psig to ~2235 psig	~2235 psig	~2235 psig	~2235 psig
Pressurizer Status	Open to containment to water solid	Water solid to bubble	Bubble	Bubble	Bubble	Bubble
Secondary Side Pressure	0 psig	0 psig	Normal operating pressure	Normal operating pressure	Normal operating pressure	Normal operating pressure

Table 2 System Status by Technical Specification Mode						
System	**Mode 6**	**Mode 5**	**Mode 4**	**Mode 3**	**Mode 2**	**Mode 1**
RCS Charging and Letdown[1]	Establish function	In service	In service	In service	In service	In service
Reactor Coolant Pumps	None running	As needed for plant heatup	As needed for plant heatup	All RCPs running	All RCPs running	All RCPs running
Reactor Trip Breakers	Open	Open	Open	Open/Closed	Closed	Closed
Residual Heat Removal	In service	In service	In service or in standby	Standby	Standby	Standby
Auxiliary Feedwater	Out of service	Out of service	Aligned for startup or in service	In service	In service	In service & then standby after switch to MFW
High Head Injection[1]	Pull to lock	Pull to lock when water solid, stand-by with bubble	Standby	Standby	Standby	Standby
Cold Overpressure Protection	Establish function	In service	In service[2]	Not required	Not required	Not required
High Flux At Shutdown Alarm (HFASA)	In service	In service	In service	In service	Not required	Not required
Source Range	Two channels in service	Two channels in service	Two channels in service	Two channels in service	Two channels in service below P-6	Not required
Intermediate Range	Not required	Not required	Not required	Not required	Two channels in service	Two channels in service below P-10
Power Range	Not required	Not required	Not required	Not required	Required	Required
Solid State Protection System	Not required	Not required	In service	In service	In service	In service
Emergency Diesel Generators	Less than full complement	Less than full complement	Full complement	Full complement	Full complement	Full complement

Notes:
1. One charging pump is operating to provide RCS charging in Modes 1-6.
2. Cold overpressurization is required in the lower part of Mode 4.

Table 3 **Initiating Events by Technical Specification Mode**						
Initiating Event	**Mode 1**	**Mode 2**	**Mode 3**	**Mode 4**	**Mode 5**	**Mode 6**
Large LOCA[1]	X	X	X			
Medium LOCA[1]	X	X	X			
Small LOCA/loss of inventory[2]	X	X	X	X	X	X
RCP Seal LOCAs (loss of seal cooling)[5]	X	X	X			
Loss of Main Feedwater	X					
Turbine Trip	X					
Loss of Decay Heat Removal[7]		X	X	X	X	X
Loss of Offsite Power	X	X	X	X	X	X
Cold Overpressurization				X	X	
SG Tube Rupture[3]	X	X	X			
Secondary Side Breaks[4]	X	X	X	X		
ATWS	X					
Boron Dilution	X	X	X	X	X	X
Rod Withdrawal[6]	X	X	X			

Notes:
1. Large and medium LOCAs are not considered in Modes 4, 5, and 6 since the RCS pressure is much lower than in Modes 1, 2, and 3.
2. Small LOCAs in Modes 4, 5, and 6 are primarily due to alignment issues and open valves, not pipe breaks or random failures of RCP seals.
3. SGTRs are not considered in Modes 4, 5, and 6 since the delta P across the tubes (P_{RCS} - $P_{secondary\ side}$) is much lower than in Mode 3.
4. Secondary side breaks are not considered in Modes 5 and 6 since the secondary side pressure is much lower than in Modes 3 and 4.
5. RCP seal LOCAs are not considered in Modes 4, 5, and 6 since the RCS pressure and temperature are much lower than in Mode 3.
6. Rod withdrawal is not considered in Modes 4, 5, and 6 since the reactor trip breakers are open.
7. Loss of MFW is applicable to plants that start up on MFW. In this case, this event is the same as the Loss of Decay Heat Removal event.

Table 4
Summary of Mode Change Limitations

To Enter Plant Operating Mode	Limitations to Enter Plant Operating Mode
5	• Two trains of RHR available, one train of RHR in service • Cold overpressure protection system in service • EDGs available • The systems supporting the operation of the above systems
4	• AFW system available (consistent with the plant specific Technical Specifications and only if dependent on AFW for startup) • High head safety injection available • Cold overpressure protection system in service • EDGs available • The systems supporting the operation of the above systems
3	• AFW system available (only if dependent on AFW for startup) • EDGs available • The systems supporting the operation of the above systems
2	• AFW system available (only if dependent on AFW for startup) • EDGs available • The systems supporting the operation of the above systems
1	• AFW system available • EDGs available • The systems supporting the operation of the above systems

LCO / BASES INSERTS

NOTE: Changes from Revision 2.1 of the ISTS NUREGs are shown. Deletions are struck through. Insertions are underlined. NUREG specific information is labeled within brackets and repeated as necessary to indicate differences.

INSERT 1 (LCO 3.0.4)

~~When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time.~~
When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall only be made:

a. When the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time;

b. After performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering the MODE or other specified condition in the Applicability, and establishment of risk management actions, if appropriate; exceptions to this Specification are stated in the individual Specifications, or

c. When an allowance is stated in the individual value, parameter, or other Specification.

This Specification shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

~~REVIEWER'S NOTE~~

~~LCO 3.0.4 has been revised so that changes in MODES or other specified conditions in the Applicability that are part of a shutdown of the unit shall not be prevented. In addition, LCO 3.0.4 has been revised so that it is only applicable for entry into a MODE or other specified condition in the Applicability in [NUREGs 1430, 1431, 1432] MODES 1, 2, 3, and 4 [NUREGs 1433, 1434] MODES 1, 2, and 3. The MODE change restrictions in LCO 3.0.4 were previously applicable in all MODES. Before this version of LCO 3.0.4 can be implemented on a plant-specific basis, the licensee must review the existing technical specifications to determine where specific restrictions on MODE changes or Required Actions should be included in individual LCOs to justify this change; such an evaluation should be summarized in a matrix of all existing LCOs to facilitate NRC staff review of a conversion to the STS.~~

NOTE: Changes from Revision 2.1 of the ISTS NUREGs are shown. Deletions are struck through. Insertions are underlined. NUREG specific information is labeled within brackets and repeated as necessary to indicate differences.

INSERT 2 (SR 3.0.4)

Entry into a MODE or other specified condition in the Applicability of an LCO shall ~~not~~ **only** be made ~~unless~~ **when** the LCO's Surveillances have been met within their specified Frequency**, except as provided by SR 3.0.3. When an LCO is not met due to Surveillances not having been met, entry into a MODE or other specified condition in the Applicability shall only be made in accordance with LCO 3.0.4.**

This provision shall not prevent entry into MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

~~---REVIEWER'S NOTE--~~

~~SR 3.0.4 has been revised so that changes in MODES or other specified conditions in the Applicability that are part of a shutdown of the unit shall not be prevented. In addition, SR 3.0.4 has been revised so that it is only applicable for entry into a MODE or other specified condition in the Applicability in [NUREGs 1430, 1431, 1432] MODES 1, 2, 3, and 4 [NUREGs 1433, 14344] MODES 1, 2, and 3. The MODE change restrictions in SR 3.0.4 were previously applicable in all MODES. Before this version of SR 3.0.4 can be implemented on a plant-specific basis, the licensee must review the existing technical specifications to determine where specific restrictions on MODE changes or Required Actions should be included in individual LCOs to justify this change; such an evaluation should be summarized in a matrix of all existing LCOs to facilitate NRC staff review of a conversion to the STS.~~

~~---~~

NOTE: Changes from Revision 2.1 of the ISTS NUREGs are shown. Deletions are struck through. Insertions are underlined. NUREG specific information is labeled within brackets and repeated as necessary to indicate differences.

INSERT 3 (LCO 3.0.4 BASES)

LCO 3.0.4 establishes limitations on changes in MODES or other specified conditions in the Applicability when an LCO is not met. It ~~precludes~~ **allows** placing the unit in a MODE or other specified condition stated in that Applicability (e.g., **the** Applicability desired to be entered) when **unit conditions are such that the requirements of the LCO would not be met, in accordance with LCO 3.0.4.a, LCO 3.0.4.b, or LCO 3.0.4.c.**
~~the following exist:~~

~~a. Unit conditions are such that the requirements of the LCO would not be met in the Applicability desired to be entered and~~

~~b. Continued noncompliance with the LCO requirements, if the Applicability were entered, would result in the unit being required to exit the Applicability desired to be entered to comply with the Required Actions.~~

LCO 3.0.4.a allows entry into a MODE or other specified condition in the Applicability with the LCO not met when the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time. Compliance with Required Actions that permit continued operation of the unit for an unlimited period of time in a MODE or other specified condition provides an acceptable level of safety for continued operation. This is without regard to the status of the unit before or after the MODE change. Therefore, in such cases, entry into a MODE or other specified condition in the Applicability may be made in accordance with the provisions of the Required Actions.

LCO 3.0.4.b allows entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering the MODE or other specified condition in the Applicability, and establishment of risk management actions, if appropriate.

The risk assessment may use quantitative, qualitative, or blended approaches, and the risk assessment will be conducted using the plant program, procedures, and criteria in place to implement 10 CFR 50.65(a)(4), which requires that risk impacts of maintenance activities to be assessed and managed. The risk assessment, for the purposes of LCO 3.0.4 (b), must take into account all inoperable Technical Specification equipment regardless of whether the equipment is included in the normal 10 CFR 50.65(a)(4) risk assessment scope. The risk assessments will be conducted using the procedures and guidance endorsed by Regulatory Guide 1.182, "Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants." Regulatory Guide 1.182 endorses the guidance in Section 11 of NUMARC 93-01, "Industry Guideline for Monitoring the

Effectiveness of Maintenance at Nuclear Power Plants." These documents address general guidance for conduct of the risk assessment, quantitative and qualitative guidelines for establishing risk management actions, and example risk management actions. These include actions to plan and conduct other activities in a manner that controls overall risk, increased risk awareness by shift and management personnel, actions to reduce the duration of the condition, actions to minimize the magnitude of risk increases (establishment of backup success paths or compensatory measures), and determination that the proposed MODE change is acceptable. Consideration should also be given to the probability of completing restoration such that the requirements of the LCO would be met prior to the expiration of ACTIONS Completion Times that would require exiting the Applicability.

LCO 3.0.4.b may be used with single, or multiple systems and components unavailable. NUMARC 93-01 provides guidance relative to consideration of simultaneous unavailability of multiple systems and components.

The results of the risk assessment shall be considered in determining the acceptability of entering the MODE or other specified condition in the Applicability, and any corresponding risk management actions. The LCO 3.0.4.b risk assessments do not have to be documented.

The Technical Specifications allow continued operation with equipment unavailable in MODE 1 for the duration of the Completion Time. Since this is allowable, and since in general the risk impact in that particular MODE bounds the risk of transitioning into and through the applicable MODES or other specified conditions in the Applicability of the LCO, the use of the LCO 3.0.4.b allowance should be generally acceptable, as long as the risk is assessed and managed as stated above. However, there is a small subset of systems and components that have been determined to be more important to risk and use of the LCO 3.0.4.b allowance is prohibited. The LCOs governing these system and components contain Notes prohibiting the use of LCO 3.0.4.b by stating that LCO 3.0.4.b is not applicable.

LCO 3.0.4.c allows entry into a MODE or other specified condition in the Applicability with the LCO not met based on a Note in the Specification which states LCO 3.0.4.c is applicable. These specific allowances permit entry into MODES or other specified conditions in the Applicability when the associated ACTIONS to be entered do not provide for continued operation for an unlimited period of time and a risk assessment has not been performed. This allowance may apply to all the ACTIONS or to a specific Required Action of a Specification. The risk assessments performed to justify the use of LCO 3.0.4.b usually only consider systems and components. For this reason, LCO 3.0.4.c is typically applied to Specifications which describe values and parameters (e.g., [Containment Air Temperature, Containment Pressure, MCPR, Moderator Temperature Coefficient]), and may be applied to other Specifications based on NRC plant-specific approval.

The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before entering an associated MODE or other specified condition in the Applicability.

The provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that result from any unit shutdown. **[NUREG-1430, 1431, 1432] In this context, a unit shutdown is defined as a change in MODE or other specified condition in the Applicability associated with transitioning from MODE 1 to MODE 2, MODE 2 to MODE 3, MODE 3 to MODE 4, and MODE 4 to MODE 5. [NUREG-1433, 1434] In this context, a unit shutdown is defined as a change in MODE or other specified condition in the Applicability associated with transitioning from MODE 1 to MODE 2, MODE 2 to MODE 3, and MODE 3 to MODE 4.**

~~LCO 3.0.4 is only applicable when entering MODE 3 from MODE 4, MODE 2 from MODE 3 or 4, or MODE 1 from MODE 2. Furthermore, LCO 3.0.4 is applicable when entering any other specified condition in the Applicability only while operating in MODE 1, 2, or 3. The requirements of LCO 3.0.4 do not apply in MODES 4 and 5, or in other specified conditions of the Applicability (unless in MODE 1, 2, or 3) because the ACTIONS of individual specifications sufficiently define the remedial measures to be taken. [In some cases (e.g., ..) these ACTIONS provide a Note that states "While this LCO is not met, entry into a MODE or other specified condition in the Applicability is not permitted, unless required to comply with ACTIONS." This Note is a requirement explicitly precluding entry into a MODE or other specified condition of the Applicability.]~~

Upon entry into a MODE or other specified condition in the Applicability with the LCO not met, LCO 3.0.1 and LCO 3.0.2 require entry into the applicable Conditions and Required Actions until the Condition is resolved, until the LCO is met, or until the unit is not within the Applicability of the Technical Specification.

Surveillances do not have to be performed on the associated inoperable equipment (or on variables outside the specified limits), as permitted by SR 3.0.1. Therefore, ~~changing MODES or other specified conditions while in an ACTIONS Condition, in compliance with~~ **utilizing** LCO 3.0.4 ~~or where an exception to LCO 3.0.4 is stated,~~ is not a violation of SR 3.0.1 or SR 3.0.4 for ~~those~~ **any** Surveillances that ~~do not~~ have **not** ~~to be~~ **been** performed **on** ~~due to the associated~~ inoperable equipment. However, SRs must be met to ensure OPERABILITY prior to declaring the associated equipment OPERABLE (or variable within limits) and restoring compliance with the affected LCO.

NOTE: Changes from Revision 2.1 of the ISTS NUREGs are shown. Deletions are struck through. Insertions are underlined. NUREG specific information is labeled within brackets and repeated as necessary to indicate differences.

INSERT 4 (SR 3.0.4 BASES)

SR 3.0.4 establishes the requirement that all applicable SRs must be met before entry into a MODE or other specified condition in the Applicability.

This Specification ensures that system and component OPERABILITY requirements and variable limits are met before entry into MODES or other specified conditions in the Applicability for which these systems and components ensure safe operation of the unit. The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before entering an associated MODE or other specified condition in the Applicability.

A provision is included to allow entry into a MODE or other specified condition in the Applicability when an LCO is not met due to Surveillance not being met in accordance with LCO 3.0.4.

However, in certain circumstances, failing to meet an SR will not result in SR 3.0.4 restricting a MODE change or other specified condition change. When a system, subsystem, division, component, device, or variable is inoperable or outside its specified limits, the associated SR(s) are not required to be performed, per SR 3.0.1, which states that surveillances do not have to be performed on inoperable equipment. When equipment is inoperable, SR 3.0.4 does not apply to the associated SR(s) since the requirement for the SR(s) to be performed is removed. Therefore, failing to perform the Surveillance(s) within the specified Frequency does not result in an SR 3.0.4 restriction to changing MODES or other specified conditions of the Applicability. However, since the LCO is not met in this instance, LCO 3.0.4 will govern any restrictions that may (or may not) apply to MODE or other specified condition changes. **SR 3.0.4 does not restrict changing MODES or other specified conditions of the Applicability when a Surveillance has not been performed within the specified Frequency, provided the requirement to declare the LCO not met has been delayed in accordance with SR 3.0.3.**

The provisions of SR 3.0.4 shall not prevent entry into MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of SR 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that result from any unit shutdown. **[NUREG-1430, 1431, 1432] In this context, a unit shutdown is defined as a change in MODE or other specified condition in the Applicability associated with transitioning from MODE 1 to MODE 2, MODE 2 to MODE 3, MODE 3 to MODE 4, and MODE 4 to MODE 5. [NUREG-1433, 1434] In this context, a unit shutdown is defined as a change in MODE or other specified condition in the Applicability associated with transitioning from MODE 1 to MODE 2, MODE 2 to MODE 3, and MODE 3 to MODE 4.**

The precise requirements for performance of SRs are specified such that exceptions to SR 3.0.4 are not necessary. The specific time frames and conditions necessary for meeting the SRs are specified in the

Frequency, in the Surveillance, or both. This allows performance of Surveillances when the prerequisite condition(s) specified in a Surveillance procedure require entry into the MODE or other specified condition in the Applicability of the associated LCO prior to the performance or completion of a Surveillance. A Surveillance that could not be performed until after entering the LCO**'s** Applicability, would have its Frequency specified such that it is not "due" until the specific conditions needed are met. Alternately, the Surveillance may be stated in the form of a Note, as not required (to be met or performed) until a particular event, condition, or time has been reached. Further discussion of the specific formats of SRs' annotation is found in Section 1.4, Frequency.

~~SR 3.0.4 is only applicable when entering MODE 3 from MODE 4, MODE 2 from MODE 3 or 4, or MODE 1 from MODE 2. Furthermore, SR 3.0.4 is applicable when entering any other specified condition in the Applicability only while operating in MODE 1, 2, or 3. The requirements of SR 3.0.4 do not apply in MODES 4 and 5, or in other specified conditions of the Applicability (unless in MODE 1, 2, or 3) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken.~~

INSERT 7 (RCS SPECIFIC ACTIVITY)

-NOTE-

LCO 3.0.4.c is applicable.

INSERT 8 (RCS SPECIFIC ACTIVITY BASES)

A Note permits the use of the provisions of LCO 3.0.4.c. This allowance permits entry into the applicable MODE(S) while relying on the ACTIONS.

BWOG INSERT 1 (LCO 3.5.3, ECCS - SHUTDOWN)

-NOTE-

LCO 3.0.4.b is not applicable to ECCS DHR loops .

BWOG INSERT 1B (3.5.3, ECCS - SHUTDOWN)

A Note prohibits the application of LCO 3.0.4.b to inoperable ECCS DHR loops when entering MODE 4 from MODE 5. There is an increased risk associated with entering MODE 4 from MODE 5 with DHR inoperable and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

BWOG INSERT 2 (LCO 3.7.5, EFW SYSTEM)

-NOTE-

LCO 3.0.4.b is not applicable when entering MODE 1.

BWOG INSERT 2B (LCO 3.7.5, EFW SYSTEM)

A Note prohibits the application of LCO 3.0.4.b to an inoperable EFW train when entering MODE 1. There is an increased risk associated with entering MODE 1 with EFW inoperable and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

BWOG INSERT 3 (LCO 3.8.1, AC SOURCES – OPERATING)

-NOTE-

LCO 3.0.4.b is not applicable to DGs.

BWOG INSERT 3B (LCO 3.8.1, AC SOURCES - OPERATING)

A Note prohibits the application of LCO 3.0.4.b to an inoperable DG. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable DG and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

WOG INSERT 1 (LCO 3.4.12, LTOP)

-NOTE-

LCO 3.0.4.b is not applicable when entering MODE 4.

WOG INSERT 1B (LCO 3.4.12, LTOP)

A Note prohibits the application of LCO 3.0.4.b to an inoperable LTOP system. There is an increased risk associated with entering MODE 4 from MODE 5 with LTOP inoperable and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

WOG INSERT 2 (LCO 3.5.3, ECCS SHUTDOWN)

-NOTE-

LCO 3.0.4.b is not applicable to ECCS high head subsystem .

WOG INSERT 2B (LCO 3.5.3, ECCS SHUTDOWN)

A Note prohibits the application of LCO 3.0.4.b to an inoperable ECCS high head subsystem when entering MODE 4. There is an increased risk associated with entering MODE 4 from MODE 5 with an inoperable ECCS high head subsystem and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

WOG INSERT 3 (LCO 3.7.5, AFW SYSTEM)

-NOTE-

LCO 3.0.4.b is not applicable [when entering MODE 1.]

WOG INSERT 3B (LCO 3.7.5, AFW SYSTEM)

-REVIEWER'S NOTE-

The LCO 3.0.4.b Note prohibits application of the LCO 3.0.4.b exception when entering MODE 1 if the plant does not depend on AFW for startup. If the plant does depend on AFW for startup, the Note should state, "LCO 3.0.4.b is not applicable."

A Note prohibits the application of LCO 3.0.4.b to an inoperable AFW train [when entering MODE 1]. There is an increased risk associated with [entering a MODE or other specified condition in the Applicability] [entering MODE 1] with an AFW train inoperable and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

WOG INSERT 4 (LCO 3.8.1, AC SOURCES - OPERATING)

- -

-NOTE-

LCO 3.0.4.b is not applicable to DGs.

- -

WOG INSERT 4B (LCO 3.8.1, AC SOURCES - OPERATING)

A Note prohibits the application of LCO 3.0.4.b to an inoperable DG. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable DG and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

CEOG INSERT 1 (LCO 3.4.12, LTOP)

-NOTE-

LCO 3.0.4.b is not applicable to PORVs when entering MODE 4.

CEOG INSERT 1B (LCO 3.4.12, LTOP)

A Note prohibits the application of LCO 3.0.4.b to inoperable PORVs used for LTOP. There is an increased risk associated with entering MODE 4 from MODE 5 with PORVs used for LTOP inoperable and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

CEOG INSERT 2 (LCO 3.5.3, ECCS SHUTDOWN)

-NOTE-

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

CEOG INSERT 2B (LCO 3.5.3, ECCS SHUTDOWN)

A Note prohibits the application of LCO 3.0.4.b to an inoperable ECCS High Pressure Safety Injection subsystem. There is an increased risk associated with entering MODE 4 from MODE 5 with an inoperable ECCS High Pressure Safety Injection subsystem and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

CEOG INSERT 3 (LCO 3.7.5, AFW SYSTEM)

-NOTE-

LCO 3.0.4.b is not applicable.

CEOG INSERT 3B (LCO 3.7.5, AFW SYSTEM)

A Note prohibits the application of LCO 3.0.4.b to an inoperable AFW train. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an AFW train inoperable and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

CEOG INSERT 4 (LCO 3.8.1, AC SOURCES - OPERATING)

- -

-NOTE-

LCO 3.0.4.b is not applicable to DGs.

- -

CEOG INSERT 4B (LCO 3.8.1, AC SOURCES - OPERATING)

A Note prohibits the application of LCO 3.0.4.b to an inoperable DG. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable DG and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

BWR4 INSERT 1 (LCO 3.5.1, ECCS - OPERATING)

-NOTE-

LCO 3.0.4.b is not applicable to HPCI.

BWR4 INSERT 1B (LCO 3.5.1, ECCS - OPERATING)

A Note prohibits the application of LCO 3.0.4.b to an inoperable HPCI subsystem 2. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable HPCI subsystem and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

BWR4 INSERT 2 (LCO 3.5.3, RCIC SYSTEM)

-NOTE-

LCO 3.0.4.b is not applicable to RCIC 2.

BWR4 INSERT 2B (LCO 3.5.3, RCIC SYSTEM)

A Note prohibits the application of LCO 3.0.4.b to an inoperable RCIC system. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable RCIC system and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

BWR4 INSERT 3 (LCO 3.8.1, AC SOURCES - OPERATING)

-NOTE-

LCO 3.0.4.b is not applicable to DGs.

BWR4 INSERT 3B (LCO 3.8.1, AC SOURCES - OPERATING)

A Note prohibits the application of LCO 3.0.4.b to an inoperable DG. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable DG and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

BWR6 INSERT 1 (LCO 3.5.1, ECCS - OPERATING)

-NOTE-

LCO 3.0.4.b is not applicable to HPCS.

BWR6 INSERT 1B (LCO 3.5.1, ECCS - OPERATING)

A Note prohibits the application of LCO 3.0.4.b to an inoperable HPCS subsystem. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable HPCS subsystem and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

BWR6 INSERT 2 (LCO 3.5.3, RCIC SYSTEM)

-NOTE-

LCO 3.0.4.b is not applicable to RCIC.

BWR6 INSERT 2B (LCO 3.5.3, RCIC SYSTEM)

A Note prohibits the application of LCO 3.0.4.b to an inoperable RCIC system. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable RCIC system and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

BWR6 INSERT 3 (LCO 3.8.1, AC SOURCES - OPERATING)

-NOTE-

LCO 3.0.4.b is not applicable to DGs.

BWR6 INSERT 3B (LCO 3.8.1, AC SOURCES - OPERATING)

A Note prohibits the application of LCO 3.0.4.b to an inoperable DG. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable DG and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY

LCO 3.0.1

LCOs shall be met during the MODES or other specified conditions in the Applicability, except as provided in LCO 3.0.2 and LCO 3.0.7.

LCO 3.0.2

Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met, except as provided in LCO 3.0.5 and LCO 3.0.6.

If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required, unless otherwise stated.

LCO 3.0.3

When an LCO is not met and the associated ACTIONS are not met, an associated ACTION is not provided, or if directed by the associated ACTIONS, the unit shall be placed in a MODE or other specified condition in which the LCO is not applicable. Action shall be initiated within 1 hour to place the unit, as applicable, in:

a. MODE 3 within 7 hours,

b. MODE 4 within 13 hours, and

c. MODE 5 within 37 hours.

Exceptions to this Specification are stated in the individual Specifications.

Where corrective measures are completed that permit operation in accordance with the LCO or ACTIONS, completion of the actions required by LCO 3.0.3 is not required.

LCO 3.0.3 is only applicable in MODES 1, 2, 3, and 4.

LCO 3.0.4

Insert I

~~When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time. This Specification shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.~~

~~Exceptions to this Specification are stated in the individual Specifications.~~

~~LCO 3.0.4 is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4.~~

3.0 LCO Applicability

LCO 3.0.4 (continued)

~~- REVIEWER'S NOTE -~~

~~LCO 3.0.4 has been revised so that changes in MODES or other specified conditions in the Applicability that are part of a shutdown of the unit shall not be prevented. In addition, LCO 3.0.4 has been revised so that it is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4. The MODE change restrictions in LCO 3.0.4 were previously applicable in all MODES. Before this version of LCO 3.0.4 can be implemented on a plant-specific basis, the licensee must review the existing technical specifications to determine where specific restrictions on MODE changes or Required Actions should be included in individual LCOs to justify this change; such an evaluation should be summarized in a matrix of all existing LCOs to facilitate NRC staff review of a conversion to the STS.~~

LCO 3.0.5 — Equipment removed from service or declared inoperable to comply with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment. This is an exception to LCO 3.0.2 for the system returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.

LCO 3.0.6 — When a supported system LCO is not met solely due to a support system LCO not being met, the Conditions and Required Actions associated with this supported system are not required to be entered. Only the support system LCO ACTIONS are required to be entered. This is an exception to LCO 3.0.2 for the supported system. In this event, an evaluation shall be performed in accordance with Specification 5.5.15, "Safety Function Determination Program (SFDP)." If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

When a support system's Required Action directs a supported system to be declared inoperable or directs entry into Conditions and Required Actions for a supported system, the applicable Conditions and Required Actions shall be entered in accordance with LCO 3.0.2.

LCO 3.0.7 — Test Exception LCOs [3.1.9, 3.1.10, 3.1.11, and 3.4.19] allow specified Technical Specification (TS) requirements to be changed to permit performance of special tests and operations. Unless otherwise specified,

3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

SR 3.0.1 SRs shall be met during the MODES or other specified conditions in the Applicability for individual LCOs, unless otherwise stated in the SR. Failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO. Failure to perform a Surveillance within the specified Frequency shall be failure to meet the LCO except as provided in SR 3.0.3. Surveillances do not have to be performed on inoperable equipment or variables outside specified limits.

SR 3.0.2 The specified Frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency, as measured from the previous performance or as measured from the time a specified condition of the Frequency is met.

For Frequencies specified as "once," the above interval extension does not apply.

If a Completion Time requires periodic performance on a "once per . . ." basis, the above Frequency extension applies to each performance after the initial performance.

Exceptions to this Specification are stated in the individual Specifications.

SR 3.0.3 If it is discovered that a Surveillance was not performed within its specified Frequency, then compliance with the requirement to declare the LCO not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified Frequency, whichever is greater. This delay period is permitted to allow performance of the Surveillance. A risk evaluation shall be performed for any Surveillance delayed greater than 24 hours and the risk impact shall be managed.

If the Surveillance is not performed within the delay period, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.

When the Surveillance is performed within the delay period and the Surveillance is not met, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.

SR 3.0.4 ~~Entry into a MODE or other specified condition in the Applicability of an LCO shall not be made unless the LCO's Surveillances have been met within their specified Frequency. This provision shall not prevent entry into~~

Insert 2

3.0 SR Applicability

SR 3.0.4 (continued)

required to comply with ACTIONS or that are part of a shutdown of the unit.

SR 3.0.4 is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4.

- REVIEWER'S NOTE -

SR 3.0.4 has been revised so that changes in MODES or other specified conditions in the Applicability that are part of a shutdown of the unit shall not be prevented. In addition, SR 3.0.4 has been revised so that it is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4. The MODE change restrictions in SR 3.0.4 were previously applicable in all MODES. Before this version of SR 3.0.4 can be implemented on a plant-specific basis, the licensee must review the existing technical specifications to determine where specific restrictions on MODE changes or Required Actions should be included in individual LCOs to justify this change; such an evaluation should be summarized in a matrix of all existing LCOs to facilitate NRC staff review of a conversion to the STS.

REVISION HISTORY

REVISION	TSTF	DESCRIPTION	APPROVED
2.1	TSTF-358, R.6	Missed Surveillance Requirements	10/01/01

3.3 INSTRUMENTATION

3.3.17 Post Accident Monitoring (PAM) Instrumentation

LCO 3.3.17 The PAM instrumentation for each Function in Table 3.3.17-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

9

- NOTE~~S~~ -

1. ~~LCO 3.0.4 is not applicable.~~

~~2.~~ Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more Functions with one required channel inoperable.	A.1	Restore required channel to OPERABLE status.	30 days
B. Required Action and associated Completion Time of Condition A not met.	B.1	Initiate action in accordance with Specification 5.6.7.	Immediately
C. **- NOTE -** Not applicable to hydrogen monitor channels. One or more Functions with two required channels inoperable.	C.1	Restore one channel to OPERABLE status.	7 days
D. Two required hydrogen monitor channels inoperable.	D.1	Restore one required hydrogen monitor channel to OPERABLE status.	72 hours

3.3 INSTRUMENTATION

3.3.18 Remote Shutdown System

LCO 3.3.18 The Remote Shutdown System Functions shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

- NOTES -

1. LCO 3.0.4 is not applicable.

2. Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required Functions inoperable.	A.1	Restore required Function to OPERABLE status.	30 days
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	<u>AND</u>		
	B.2	Be in MODE 4.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.18.1	[Perform CHANNEL CHECK for each required instrumentation channel that is normally energized.	31 days]
SR 3.3.18.2	Verify each required control circuit and transfer switch is capable of performing the intended function.	[18] month

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.15 RCS Leakage Detection Instrumentation

LCO 3.4.15 The following RCS leakage detection instrumentation shall be OPERABLE:

a. One containment sump monitor and

b. One containment atmosphere radioactivity monitor (gaseous or particulate).

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

ACTIONS

- NOTE -

~~LCO 3.0.4 is not applicable.~~

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Required containment sump monitor inoperable.	A.1	**- NOTE -** Not required until 12 hours after establishment of steady state operation.	
		Perform SR 3.4.13.1.	Once per 24 hours
	AND		
	A.2	Restore required containment sump monitor to OPERABLE status.	30 days
B. Required containment atmosphere radioactivity monitor inoperable.	B.1.1	Analyze grab samples of the containment atmosphere.	Once per 24 hours
	OR		

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.16 RCS Specific Activity

LCO 3.4.16 The specific activity of the reactor coolant shall be within limits.

APPLICABILITY: MODES 1 and 2,
MODE 3 with RCS average temperature (T_{avg}) ≥ 500°F.

Insert 7

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. DOSE EQUIVALENT I-131 > 1.0 μCi/gm.	~~- NOTE - LCO 3.0.4 is not applicable.~~	
	A.1 Verify DOSE EQUIVALENT I-131 within the acceptable region of Figure 3.4.16-1.	Once per 4 hours
	AND	
	A.2 Restore DOSE EQUIVALENT I-131 to within limit.	48 hours
B. Required Action and associated Completion Time of Condition A not met. OR DOSE EQUIVALENT I-131 in unacceptable region of Figure 3.4.16-1.	B.1 Be in MODE 3 with T_{avg} < 500°F.	6 hours

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.3 ECCS - Shutdown

LCO 3.5.3 One ECCS train shall be OPERABLE.

- NOTES -

1. A DHR train may be considered OPERABLE during alignment and operation for DHR, if capable of being manually realigned to the ECCS mode of operation.

2. High pressure injection (HPI) may be de-activated in accordance with LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System."

APPLICABILITY: MODE 4.

BWOG-Insert 1

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Required ECCS decay heat removal (DHR) loop inoperable.	A.1	Initiate action to restore required ECCS DHR loop to OPERABLE status.	Immediately
B. Required ECCS HPI subsystem inoperable.	B.1	Restore required ECCS HPI subsystem to OPERABLE status.	1 hour
C. Required Action and associated Completion Time of Condition B not met.	C.1	Be in MODE 5.	24 hours

3.6 CONTAINMENT SYSTEMS

3.6.8 Hydrogen Recombiners (if permanently installed)

LCO 3.6.8 Two hydrogen recombiners shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One hydrogen recombiner inoperable.	A.1	~~- NOTE -~~ ~~LCO 3.0.4 is not applicable.~~ Restore hydrogen recombiner to OPERABLE status.	 30 days
B. [Two hydrogen recombiners inoperable.	B.1	Verify by administrative means that the hydrogen control function is maintained.	1 hour AND Every 12 hours thereafter
	AND		
	B.2	Restore one hydrogen recombiner to OPERABLE status.	7 days]
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours

3.7 PLANT SYSTEMS

3.7.4 Atmospheric Vent Valves (AVVs)

LCO 3.7.4 [Two] AVVs [lines per steam generator] shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 when steam generator is relied upon for heat removal.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One required AVV [line] inoperable.	A.1	~~- NOTE - LCO 3.0.4 is not applicable.~~	
		Restore required AVV [line] to OPERABLE status.	[7 days]
B. **[** Two or more required AVV [lines] inoperable.	B.1	Restore all but one AVV [line] to OPERABLE status.	24 hours **]**
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
	<u>AND</u>		
	C.2	Be in MODE 4 without reliance upon steam generator for heat removal.	[24] hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.4.1	Verify one complete cycle of each AVV.	[18] months

3.7 PLANT SYSTEMS

3.7.5 Emergency Feedwater (EFW) System

LCO 3.7.5 [Three] EFW trains shall be OPERABLE.

- NOTE -
Only one EFW train, which includes a motor driven pump, is required to be OPERABLE in MODE 4.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 when steam generator is relied upon for heat removal.

BWOG Insert 2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. **[** One steam supply to turbine driven EFW pump inoperable. OR ------------------------ **- NOTE -** Only applicable if MODE 2 has not been entered following refueling. ------------------------ One turbine driven EFW pump inoperable in MODE 3 following refueling.	A.1 Restore affected equipment to OPERABLE status.	7 days AND 10 days from discovery of failure to meet the LCO **]**
B. One EFW train inoperable [for reasons other than Condition A] in MODE 1, 2, or 3.	B.1 Restore EFW train to OPERABLE status.	72 hours AND [10 days from discovery of failure to meet the LCO

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources - Operating

LCO 3.8.1 The following AC electrical power sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System,

b. Two diesel generators (DGs) each capable of supplying one train of the onsite Class 1E AC Electrical Power Distribution System, and

[c. Automatic load sequencers for Train A and Train B. **]**

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

BWOG Insert 3

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One [required] offsite circuit inoperable.	A.1	Perform SR 3.8.1.1 for OPERABLE [required] offsite circuit.	1 hour AND Once per 8 hours thereafter
	AND		
	A.2	Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.	24 hours from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)
	AND		

BASES

LCO 3.0.3 (continued)

The time limits of LCO 3.0.3 allow 37 hours for the unit to be in MODE 5 when a shutdown is required during MODE 1 operation. If the unit is in a lower MODE of operation when a shutdown is required, the time limit for reaching the next lower MODE applies. If a lower MODE is reached in less time than allowed, however, the total allowable time to reach MODE 5, or other applicable MODE, is not reduced. For example, if MODE 3 is reached in 2 hours, then the time allowed for reaching MODE 4 is the next 11 hours, because the total time for reaching MODE 4 is not reduced from the allowable limit of 13 hours. Therefore, if remedial measures are completed that would permit a return to MODE 1, a penalty is not incurred by having to reach a lower MODE of operation in less than the total time allowed.

In MODES 1, 2, 3, and 4, LCO 3.0.3 provides actions for Conditions not covered in other Specifications. The requirements of LCO 3.0.3 do not apply in MODES 5 and 6 because the unit is already in the most restrictive Condition required by LCO 3.0.3. The requirements of LCO 3.0.3 do not apply in other specified conditions of the Applicability (unless in MODE 1, 2, 3, or 4) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken.

Exceptions to LCO 3.0.3 are provided in instances where requiring a unit shutdown, in accordance with LCO 3.0.3, would not provide appropriate remedial measures for the associated condition of the unit. An example of this is in LCO 3.7.14, "Fuel Storage Pool Water Level." LCO 3.7.14 has an Applicability of "During movement of irradiated fuel assemblies in fuel storage pool." Therefore, this LCO can be applicable in any or all MODES. If the LCO and the Required Actions of LCO 3.7.14 are not met while in MODE 1, 2, 3, or 4, there is no safety benefit to be gained by placing the unit in a shutdown condition. The Required Action of LCO 3.7.14 of "Suspend movement of irradiated fuel assemblies in fuel storage pool" is the appropriate Required Action to complete in lieu of the actions of LCO 3.0.3. These exceptions are addressed in the individual Specifications.

LCO 3.0.4

Insert 3

~~LCO 3.0.4 establishes limitations on changes in MODES or other specified conditions in the Applicability when an LCO is not met. It precludes placing the unit in a MODE or other specified condition stated in that Applicability (e.g., Applicability desired to be entered) when the following exist:~~

~~a. Unit conditions are such that the requirements of the LCO would not be met in the Applicability desired to be entered and~~

BASES

LCO 3.0.4 (continued)

b. Continued noncompliance with the LCO requirements, if the Applicability were entered, would result in the unit being required to exit the Applicability desired to be entered to comply with the Required Actions.

Compliance with Required Actions that permit continued operation of the unit for an unlimited period of time in a MODE or other specified condition provides an acceptable level of safety for continued operation. This is without regard to the status of the unit before or after the MODE change. Therefore, in such cases, entry into a MODE or other specified condition in the Applicability may be made in accordance with the provisions of the Required Actions. The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before entering an associated MODE or other specified condition in the Applicability.

The provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that result from any unit shutdown.

Exceptions to LCO 3.0.4 are stated in the individual Specifications. These exceptions allow entry into MODES or other specified conditions in the Applicability when the associated ACTIONS to be entered do not provide for continued operation for an unlimited period of time. Exceptions may apply to all the ACTIONS or to a specific Required Action of a Specification.

LCO 3.0.4 is only applicable when entering MODE 4 from MODE 5, MODE 3 from MODE 4, MODE 2 from MODE 3, or MODE 1 from MODE 2. Furthermore, LCO 3.0.4 is applicable when entering any other specified condition in the Applicability only while operating in MODES 1, 2, 3, or 4. The requirements of LCO 3.0.4 do not apply in MODES 5 and 6, or in other specified conditions of the Applicability (unless in MODES 1, 2, 3, or 4) because the ACTIONS of individual specifications sufficiently define the remedial measures to be taken. **[** In some cases (e.g., ..) these ACTIONS provide a Note that states "While this LCO is not met, entry into a MODE or other specified condition in the Applicability is not permitted, unless required to comply with ACTIONS." This Note is a requirement explicitly precluding entry into a MODE or other specified condition of the Applicability.**]**

BASES

LCO 3.0.4 (continued)

Surveillances do not have to be performed on the associated inoperable equipment (or on variables outside the specified limits), as permitted by SR 3.0.1. Therefore, changing MODES or other specified conditions while in an ACTIONS Condition, in compliance with LCO 3.0.4 or where an exception to LCO 3.0.4 is stated, is not a violation of SR 3.0.1 or SR 3.0.4 for those Surveillances that do not have to be performed due to the associated inoperable equipment. However, SRs must be met to ensure OPERABILITY prior to declaring the associated equipment OPERABLE (or variable within limits) and restoring compliance with the affected LCO.

LCO 3.0.5

LCO 3.0.5 establishes the allowance for restoring equipment to service under administrative controls when it has been removed from service or declared inoperable to comply with ACTIONS. The sole purpose of this Specification is to provide an exception to LCO 3.0.2 (e.g., to not comply with the applicable Required Action(s)) to allow the performance of required testing to demonstrate either:

a. The OPERABILITY of the equipment being returned to service or

b. The OPERABILITY of other equipment.

The administrative controls ensure the time the equipment is returned to service in conflict with the requirements of the ACTIONS is limited to the time absolutely necessary to perform the required testing to demonstrate OPERABILITY. This Specification does not provide time to perform any other preventive or corrective maintenance.

An example of demonstrating the OPERABILITY of the equipment being returned to service is reopening a containment isolation valve that has been closed to comply with Required Actions, and must be reopened to perform the required testing.

An example of demonstrating the OPERABILITY of other equipment is taking an inoperable channel or trip system out of the tripped condition to prevent the trip function from occurring during the performance of required testing on another channel in the other trip system. A similar example of demonstrating the OPERABILITY of other equipment is taking an inoperable channel or trip system out of the tripped condition to permit the logic to function and indicate the appropriate response during the performance of required testing on another channel in the same trip system.

BASES

SR 3.0.4

~~SR 3.0.4 establishes the requirement that all applicable SRs must be met before entry into a MODE or other specified condition in the Applicability.~~

~~This Specification ensures that system and component OPERABILITY requirements and variable limits are met before entry into MODES or other specified conditions in the Applicability for which these systems and components ensure safe operation of the unit.~~

~~The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before entering an associated MODE or other specified condition in the Applicability.~~

Insert 4

~~However, in certain circumstances, failing to meet an SR will not result in SR 3.0.4 restricting a MODE change or other specified condition change. When a system, subsystem, division, component, device, or variable is inoperable or outside its specified limits, the associated SR(s) are not required to be performed, per SR 3.0.1, which states that surveillances do not have to be performed on inoperable equipment. When equipment is inoperable, SR 3.0.4 does not apply to the associated SR(s) since the requirement for the SR(s) to be performed is removed. Therefore, failing to perform the Surveillance(s) within the specified Frequency does not result in an SR 3.0.4 restriction to changing MODES or other specified conditions of the Applicability. However, since the LCO is not met in this instance, LCO 3.0.4 will govern any restrictions that may (or may not) apply to MODE or other specified condition changes.~~

~~The provisions of SR 3.0.4 shall not prevent entry into MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of SR 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that result from any unit shutdown.~~

~~The precise requirements for performance of SRs are specified such that exceptions to SR 3.0.4 are not necessary. The specific time frames and conditions necessary for meeting the SRs are specified in the Frequency, in the Surveillance, or both. This allows performance of Surveillances when the prerequisite condition(s) specified in a Surveillance procedure require entry into the MODE or other specified condition in the Applicability of the associated LCO prior to the performance or completion of a Surveillance. A Surveillance that could not be performed until after entering the LCO Applicability, would have its Frequency specified such that it is not "due" until the specific conditions needed are met. Alternately, the Surveillance may be stated in the form of a Note, as not required (to be met or performed) until a particular event, condition, or time has been reached. Further discussion of the specific formats of SRs' annotation is found in Section 1.4, Frequency.~~

BASES

SR 3.0.4 (continued)

~~SR 3.0.4 is only applicable when entering MODE 4 from MODE 5, MODE 3 from MODE 4, MODE 2 from MODE 3, or MODE 1 from MODE 2. Furthermore, SR 3.0.4 is applicable when entering any other specified condition in the Applicability only while operating in MODES 1, 2, 3, or 4. The requirements of SR 3.0.4 do not apply in MODES 5 and 6, or in other specified conditions of the Applicability (unless in MODES 1, 2, 3, or 4) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken.~~

REVISION HISTORY

REVISION	TSTF	DESCRIPTION	APPROVED
2.1	TSTF-358, R.6	Missed Surveillance Requirements	10/01/01

BASES

LCO (continued)

conjunction with LPI flow, is also used to determine if a core flood line break has occurred.

APPLICABILITY

The PAM instrumentation LCO is applicable in MODES 1, 2, and 3. These variables are related to the diagnosis and preplanned actions required to mitigate DBAs. The applicable DBAs are assumed to occur in MODES 1, 2, and 3. In MODES 4, 5, and 6, unit conditions are such that the likelihood of an event occurring that would require PAM instrumentation is low; therefore, the PAM instrumentation is not required to be OPERABLE in these MODES.

ACTIONS

~~The ACTIONS are modified by two Notes. Note 1 is added to the ACTIONS to exclude the MODE change restriction of LCO 3.0.4. This exception allows entry into an applicable MODE while relying on the ACTIONS even though the ACTIONS may eventually require a unit shutdown. This exception is acceptable due to the passive function of the instruments, the operator's ability to respond to an accident utilizing alternate instruments and methods, and the low probability of an event requiring these instruments.~~

A Note 2 is added to the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed in Table 3.3.17-1. The Completion Time(s) of the inoperable channels of a Function will be tracked separately for each Function starting from the time the Condition was entered for that Function.

A.1

When one or more Functions have one required channel inoperable, the inoperable channel must be restored to OPERABLE status within 30 days. The 30 day Completion Time is based on operating experience. This takes into account the remaining OPERABLE channel (or, in the case of a Function that has only one required channel, other non-Regulatory Guide 1.97 instrument channels to monitor the Function), the passive nature of the instrument (no critical automatic action is assumed to occur from these instruments), and the low probability of an event requiring PAM instrumentation during this interval.

BASES

APPLICABILITY (continued)

instrument and control Functions if control room instruments become unavailable.

ACTIONS

~~The ACTIONS is modified by two Notes. Note 1 excludes the MODE change restriction of LCO 3.0.4. This exception allows entry into an applicable MODE while relying on the ACTIONS, even though the ACTIONS may eventually require a unit shutdown. This exception is acceptable due to the low probability of an event requiring these instruments.~~

A Remote Shutdown system division is inoperable when each function is not accomplished by at least one designated Remote Shutdown System channel that satisfies the OPERABILITY criteria for the channel's Function. These criteria are outlined in the LCO section of the Bases.

A Note ~~2~~ has been added to the ACTIONS to clarify the application of Completion Time rules. The Conditions of the Specification may be entered independently for each Function. The Completion Time(s) of the inoperable channel(s)/train(s) of a Function will be tracked separately for each Function starting from the time the Condition was entered for that Function.

<u>A.1</u>

Condition A addresses the situation where one or more required Functions of the Remote Shutdown System are inoperable. This includes the control and transfer switches for any required Function.

The Required Action is to restore the required Function to OPERABLE status within 30 days. The Completion Time is based on operating experience and takes into account the remaining OPERABLE division and the low probability of an event that would require evacuation of the control room.

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

If Required Action A.1 cannot be met within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

BASES

LCO (continued)

The LCO requirements are satisfied when monitors of diverse measurement means are available. Thus, the containment sump monitor, in combination with a particulate or gaseous radioactivity monitor, provides an acceptable minimum.

APPLICABILITY

Because of elevated RCS temperature and pressure in MODES 1, 2, 3, and 4, RCS leakage detection instrumentation is required to be OPERABLE.

In MODE 5 or 6, the temperature is ≤ 200°F and pressure is maintained low or at atmospheric pressure. Since the temperatures and pressures are far lower than those for MODES 1, 2, 3, and 4, the likelihood of leakage and crack propagation is much smaller. Therefore, the requirements of this LCO are not applicable in MODES 5 and 6.

ACTIONS

~~The Actions are modified by a Note indicating that the provisions of LCO 3.0.4 do not apply. As a result, a MODE change is allowed when the sump and required radiation monitors are inoperable. This allowance is provided because other instrumentation is available to monitor RCS LEAKAGE.~~

A.1 and A.2

With the required containment sump monitor inoperable, no other form of sampling can provide the equivalent information.

However, the containment atmosphere activity monitor will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS inventory balance, SR 3.4.13.1, water inventory balance, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after establishing steady state operation (stable temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and [RCP seal injection and return flows]). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

Restoration of the required sump monitor to OPERABLE status is required to regain the function in a Completion Time of 30 days after the monitor's failure. This time is acceptable considering the frequency and

BASES

APPLICABILITY (continued)

consequences of an SGTR to within the acceptable site boundary dose values.

For operation in MODE 3 with RCS average temperature < 500°F, and in MODES 4 and 5, the release of radioactivity in the event of an SGTR is unlikely since the saturation pressure of the reactor coolant is below the lift pressure settings of the atmospheric dump valves and main steam safety valves.

ACTIONS

A.1 and A.2

With the DOSE EQUIVALENT I-131 greater than the LCO limit, samples at intervals of 4 hours must be taken to demonstrate the limits of Figure 3.4.16-1 are not exceeded. The Completion Time of 4 hours is required to obtain and analyze a sample. Sampling must continue for trending.

The DOSE EQUIVALENT I-131 must be restored to limits within 48 hours. The Completion Time of 48 hours is required, if the limit violation resulted from normal iodine spiking.

Insert B

~~A Note to the Required Actions of Condition A excludes the MODE change restriction of LCO 3.0.4. This exception allows entry into the applicable MODE(S) while relying on the ACTIONS even though the ACTIONS may eventually require plant shutdown.~~ This ~~exception~~ allowance is acceptable due to the significant conservatism incorporated into the specific activity limit, the low probability of an event which is limiting due to exceeding this limit, and the ability to restore transient specific activity excursions while the plant remains at, or proceeds to power operation.

B.1

If a Required Action and associated Completion Time of Condition A are not met or if the DOSE EQUIVALENT I-131 is in the unacceptable region of Figure 3.4.16-1, the reactor must be brought to MODE 3 with RCS average temperature < 500°F within 6 hours. The Completion Time of 6 hours is required to get to MODE 3 below 500°F without challenging reactor emergency systems.

C.1

With the gross specific activity in excess of the allowed limit, the unit must be placed in a MODE in which the requirement does not apply.

BASES

LCO (continued)

cold leg injection nozzles. In the long term, this flow path may be switched to take its supply from the containment sump and to supply its flow to the RCS hot and cold legs.

This LCO is modified by two Notes. The first allows a DHR train to be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned (remote or local) to the ECCS mode of operation and not otherwise inoperable. This allows operation in the DHR mode during MODE 4. The second Note states that HPI actuation may be deactivated in accordance with LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System." Operator action is then required to initiate HPI. In the event of a loss of coolant accident (LOCA) requiring HPI actuation, the time required for operator action has been shown by analysis to be acceptable.

APPLICABILITY

In MODES 1, 2, and 3, the OPERABILITY requirements for the ECCS are covered by LCO 3.5.2.

In MODE 4 with the RCS temperature below 280°F, one OPERABLE ECCS train is acceptable without single failure consideration, on the basis of the stable reactivity condition of the reactor and the limited core cooling requirements.

In MODES 5 and 6, plant conditions are such that the probability of an event requiring ECCS injection is extremely low. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops - MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops - MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.4, "DHR and Coolant Circulation - High Water Level," and LCO 3.9.5, "DHR and Coolant Circulation - Low Water Level."

ACTIONS

BWOG Insert 1B

<u>A.1</u>

If no LPI subsystem train is OPERABLE, the unit is not prepared to respond to a LOCA or to continue cooldown using the LPI pumps and decay heat exchangers. The Completion Time of immediately, which would initiate action to restore at least one ECCS LPI subsystem to OPERABLE status, ensures that prompt action is taken to restore the required cooling capacity. Normally, in MODE 4, reactor decay heat must be removed by an LPI train operating with suction from the RCS. If no LPI train is OPERABLE for this function, reactor decay heat must be removed by some alternate method, such as use of the steam

BASES

ACTIONS

A.1

With one hydrogen recombiner inoperable, the inoperable recombiner must be restored to OPERABLE status within 30 days. In this condition, the remaining OPERABLE recombiner is adequate to perform the hydrogen control function. However, the overall reliability is reduced because a single failure in the OPERABLE recombiner could result in a reduced hydrogen control capability. The 30 day Completion Time is based on the availability of the other hydrogen recombiner, the small probability of a LOCA or SLB occurring (that would generate an amount of hydrogen that exceeds the flammability limit), and the amount of time available after a LOCA or SLB (should one occur) for operator action to prevent hydrogen accumulation from exceeding the flammability limit.

~~Required Action A.1 has been modified by a Note stating that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when one hydrogen recombiner is inoperable. This allowance is based on the availability of the other hydrogen recombiner, the small probability of a LOCA or SLB occurring (that would generate an amount of hydrogen that exceeds the flammability limit), and the amount of time available after a LOCA or SLB (should one occur) for operator action to prevent hydrogen accumulation from exceeding the flammability limit.~~

B.1 and B.2

- REVIEWER'S NOTE -

This Condition is only allowed for units with an alternate hydrogen control system acceptable to the technical staff.

With two hydrogen recombiners inoperable, the ability to perform the hydrogen control function via alternate capabilities must be verified by administrative means within 1 hour. The alternate hydrogen control capabilities are provided by [the containment Hydrogen Purge System/hydrogen recombiner/Hydrogen Ignitor System/Hydrogen Mixing System/Containment Air Dilution System/Containment Inerting System]. The 1 hour Completion Time allows a reasonable period of time to verify that a loss of hydrogen control function does not exist.

BASES

ACTIONS

A.1

~~Required Action A.1 is modified by a Note indicating that LCO 3.0.4 does not apply.~~

With one AVV [line] inoperable, action must be taken to restore the inoperable AVV to OPERABLE status. The 7 day Completion Time allows for redundant capability afforded by the remaining OPERABLE AVV and a nonsafety grade backup in the Steam Bypass System and MSSVs.

[B.1

With more than one AVV [line] inoperable, action must be taken to restore [all but one] AVV [lines] to OPERABLE status. As the block valve can be closed to isolate an AVV, some repairs may be possible with the unit at power. The 24 hour Completion Time is reasonable to repair inoperable AVV [lines], based on the availability of the Steam Bypass System and MSSVs, and the low probability of an event occurring during this period that would require the AVV [lines].]

C.1 and C.2

If the AVV [lines] cannot be restored to OPERABLE status within the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours, and in MODE 4 within [24] hours, without reliance upon the steam generator for heat removal. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.4.1

To perform a controlled cooldown of the RCS, the AVVs must be able to be opened either remotely or locally and throttled through their full range. This SR ensures that the AVVs are tested through a full control cycle at least once per fuel cycle. Performance of inservice testing or use of an AVV during a unit cooldown may satisfy this requirement. Operating experience has shown that these components usually pass the Surveillance when performed at the [18] month Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

BASES

ACTIONS

BWOG Insert 2B

[A.1

With one of the two steam supplies to the turbine driven EFW pump inoperable, or if a turbine driven pump is inoperable while in MODE 3 immediately following refueling, action must be taken to restore the inoperable equipment to an OPERABLE status within 7 days. The 7 day Completion Time is reasonable, based on the following reasons:

a. For the inoperability of a steam supply to the turbine driven EFW pump, the 7 day Completion time is reasonable since there is a redundant steam supply line for the turbine driven pump.

b. For the inoperability of a turbine driven EFW pump while in MODE 3 immediately subsequent to a refueling, the 7 day Completion time is reasonable due to the minimal decay heat levels in this situation.

c. For both the inoperability of a steam supply line to the turbine driven pump and an inoperable turbine driven EFW pump while in MODE 3 immediately following refueling, the 7 day Completion Time is reasonable due to the availability of redundant OPERABLE motor driven EFW pumps, and due to the low probability of an event requiring the use of the turbine driven EFW pump.

The second Completion Time for Required Action A.1 establishes a limit on the maximum time allowed for any combination of Conditions to be inoperable during any continuous failure to meet this LCO.

The 10 day Completion Time provides a limitation time allowed in this specified Condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The AND connector between 72 hours and 10 days dictates that both Completion Times apply simultaneously, and the more restrictive must be met.

Condition A is modified by a Note which limits the applicability of the Condition to when the unit has not entered MODE 2 following a refueling. Condition A allows one EFW train to be inoperable for 7 days vice the 72 hour Completion Time in Condition B. This longer Completion Time is based on the reduced decay heat following refueling and prior to the reactor being critical.]

B.1

When one of the required EFW trains (pump or flow path) is inoperable, action must be taken to restore the train to OPERABLE status within

BASES

LCO (continued)

The AC sources in one train must be separate and independent (to the extent possible) of the AC sources in the other train. For the DGs, separation and independence are complete.

For the offsite AC sources, separation and independence are to the extent practical. [A circuit may be connected to more than one ESF bus, with fast-transfer capability to the other circuit OPERABLE, and not violate separation criteria. A circuit that is not connected to an ESF bus is required to have OPERABLE fast-transfer interlock mechanisms to at least two ESF buses to support OPERABILITY of that circuit.]

APPLICABILITY

The AC sources [and sequencers] are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The AC power requirements for MODES 5 and 6 are covered in LCO 3.8.2, "AC Sources - Shutdown."

ACTIONS

BWOG Insert 3B

A.1

To ensure a highly reliable power source remains with one offsite circuit inoperable, it is necessary to verify the OPERABILITY of the remaining required offsite circuit on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However, if a second required circuit fails SR 3.8.1.1, the second offsite circuit is inoperable, and Condition C, for two offsite circuits inoperable, is entered.

- REVIEWER'S NOTE -

The turbine driven auxiliary feedwater pump is only required to be considered a redundant required feature, and, therefore, required to be determined OPERABLE by this Required Action, if the design is such that the remaining OPERABLE motor or turbine driven auxiliary feedwater pump(s) is not by itself capable (without any reliance on the motor driven

3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY

LCO 3.0.1

LCOs shall be met during the MODES or other specified conditions in the Applicability, except as provided in LCO 3.0.2 and LCO 3.0.7.

LCO 3.0.2

Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met, except as provided in LCO 3.0.5 and LCO 3.0.6.

If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required unless otherwise stated.

LCO 3.0.3

When an LCO is not met and the associated ACTIONS are not met, an associated ACTION is not provided, or if directed by the associated ACTIONS, the unit shall be placed in a MODE or other specified condition in which the LCO is not applicable. Action shall be initiated within 1 hour to place the unit, as applicable, in:

a. MODE 3 within 7 hours,

b. MODE 4 within 13 hours, and

c. MODE 5 within 37 hours.

Exceptions to this Specification are stated in the individual Specifications.

Where corrective measures are completed that permit operation in accordance with the LCO or ACTIONS, completion of the actions required by LCO 3.0.3 is not required.

LCO 3.0.3 is only applicable in MODES 1, 2, 3, and 4.

LCO 3.0.4

Insert 1

~~When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time. This Specification shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.~~

~~Exceptions to this Specification are stated in the individual Specifications.~~

~~LCO 3.0.4 is only applicable for entry into a MODE or others specified condition in the Applicability in MODES 1, 2, 3, and 4.~~

3.0 LCO Applicability

LCO 3.0.4 (continued)

- REVIEWER'S NOTE -

LCO 3.0.4 has been revised so that changes in MODES or other specified conditions in the Applicability that are part of a shutdown of the unit shall not be prevented. In addition, LCO 3.0.4 has been revised so that it is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4. The MODE change restrictions in LCO 3.0.4 were previously applicable in all MODES. Before this version of LCO 3.0.4 can be implemented on a plant-specific basis, the licensee must review the existing technical specifications to determine where specific restrictions on MODE changes or Required Actions should be included in individual LCOs to justify this change; such an evaluation should be summarized in a matrix of all existing LCOs to facilitate NRC staff review of a conversion to the STS.

LCO 3.0.5 Equipment removed from service or declared inoperable to comply with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment. This is an exception to LCO 3.0.2 for the system returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.

LCO 3.0.6 When a supported system LCO is not met solely due to a support system LCO not being met, the Conditions and Required Actions associated with this supported system are not required to be entered. Only the support system LCO ACTIONS are required to be entered. This is an exception to LCO 3.0.2 for the supported system. In this event, an evaluation shall be performed in accordance with Specification 5.5.15, "Safety Function Determination Program (SFDP)." If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

When a support system's Required Action directs a supported system to be declared inoperable or directs entry into Conditions and Required Actions for a supported system, the applicable Conditions and Required Actions shall be entered in accordance with LCO 3.0.2.

LCO 3.0.7 Test Exception LCOs [3.1.8 and 3.4.19] allow specified Technical Specification (TS) requirements to be changed to permit performance of special tests and operations. Unless otherwise specified, all other TS requirements remain unchanged. Compliance with Test Exception LCOs

3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

SR 3.0.1

SRs shall be met during the MODES or other specified conditions in the Applicability for individual LCOs, unless otherwise stated in the SR. Failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO. Failure to perform a Surveillance within the specified Frequency shall be failure to meet the LCO except as provided in SR 3.0.3. Surveillances do not have to be performed on inoperable equipment or variables outside specified limits.

SR 3.0.2

The specified Frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency, as measured from the previous performance or as measured from the time a specified condition of the Frequency is met.

For Frequencies specified as "once," the above interval extension does not apply.

If a Completion Time requires periodic performance on a "once per . . ." basis, the above Frequency extension applies to each performance after the initial performance.

Exceptions to this Specification are stated in the individual Specifications.

SR 3.0.3

If it is discovered that a Surveillance was not performed within its specified Frequency, then compliance with the requirement to declare the LCO not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified Frequency, whichever is greater. This delay period is permitted to allow performance of the Surveillance. A risk evaluation shall be performed for any Surveillance delayed greater than 24 hours and the risk impact shall be managed.

If the Surveillance is not performed within the delay period, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.

When the Surveillance is performed within the delay period and the Surveillance is not met, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.

SR 3.0.4

Insert 2

~~Entry into a MODE or other specified condition in the Applicability of an LCO shall not be made unless the LCO's Surveillances have been met within their specified Frequency. This provision shall not prevent entry into MODES or other specified conditions in the Applicability that are~~

3.0 SR Applicability

SR 3.0.4 (continued)

required to comply with ACTIONS or that are part of a shutdown of the unit.

SR 3.0.4 is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3 and 4.

- REVIEWER'S NOTE -

SR 3.0.4 has been revised so that changes in MODES or other specified conditions in the Applicability that are part of a shutdown of the unit shall not be prevented. In addition, SR 3.0.4 has been revised so that it is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4. The MODE change restrictions in SR 3.0.4 were previously applicable in all MODES. Before this version of SR 3.0.4 can be implemented on a plant-specific basis, the licensee must review the existing technical specifications to determine where specific restrictions on MODE changes or Required Actions should be included in individual LCOs to justify this change; such an evaluation should be summarized in a matrix of all existing LCOs to facilitate NRC staff review of a conversion to the STS.

REVISION HISTORY

REVISION	TSTF	DESCRIPTION	APPROVED
2.1	TSTF-358, R.6	Missed Surveillance Requirements	10/01/01

3.3 INSTRUMENTATION

3.3.3 Post Accident Monitoring (PAM) Instrumentation

LCO 3.3.3 The PAM instrumentation for each Function in Table 3.3.3-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

- NOTE~~S~~ -

1. ~~LCO 3.0.4 is not applicable.~~

~~2.~~ Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more Functions with one required channel inoperable.	A.1	Restore required channel to OPERABLE status.	30 days
B. Required Action and associated Completion Time of Condition A not met.	B.1	Initiate action in accordance with Specification 5.6.7.	Immediately
C. ------------------------- **- NOTE -** Not applicable to hydrogen monitor channels. ------------------------- One or more Functions with two required channels inoperable.	C.1	Restore one channel to OPERABLE status.	7 days
D. Two hydrogen monitor channels inoperable.	D.1	Restore one hydrogen monitor channel to OPERABLE status.	72 hours

3.3 INSTRUMENTATION

3.3.4 Remote Shutdown System

LCO 3.3.4 The Remote Shutdown System Functions shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

- NOTES -

1. LCO 3.0.4 is not applicable.
2. Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required Functions inoperable.	A.1	Restore required Function to OPERABLE status.	30 days
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	6 hours
	AND		
	B.2	Be in MODE 4.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.4.1	[Perform CHANNEL CHECK for each required instrumentation channel that is normally energized.	31 days]
SR 3.3.4.2	Verify each required control circuit and transfer switch is capable of performing the intended function.	[18] months

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.11 Pressurizer Power Operated Relief Valves (PORVs)

LCO 3.4.11 Each PORV and associated block valve shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

- NOTE~~S~~ -

1. Separate Condition entry is allowed for each PORV.

~~2. LCO 3.0.4 is not applicable.~~

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more PORVs inoperable and capable of being manually cycled.	A.1	Close and maintain power to associated block valve.	1 hour
B. One [or two] PORV[s] inoperable and not capable of being manually cycled.	B.1	Close associated block valve[s].	1 hour
	<u>AND</u>		
	B.2	Remove power from associated block valve[s].	1 hour
	<u>AND</u>		
	B.3	Restore PORV[s] to OPERABLE status.	72 hours

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.12 Low Temperature Overpressure Protection (LTOP) System

LCO 3.4.12

An LTOP System shall be OPERABLE with a maximum of [one] [high pressure injection (HPI)] pump [and one charging pump] capable of injecting into the RCS and the accumulators isolated and one of the following pressure relief capabilities:

a. Two power operated relief valves (PORVs) with lift settings within the limits specified in the PTLR,

[b. Two residual heat removal (RHR) suction relief valves with setpoints ≥ [436.5] psig and ≤ [463.5] psig,]

[c. One PORV with a lift setting within the limits specified in the PTLR and one RHR suction relief valve with a setpoint ≥ [436.5] psig and ≤ [463.5] psig,] or

d. The RCS depressurized and an RCS vent of ≥ [2.07] square inches.

APPLICABILITY:

MODE 4 when any RCS cold leg temperature is ≤ [275°F] [LTOP arming temperature specified in the PTLR],
MODE 5,
MODE 6 when the reactor vessel head is on.

- NOTE -

Accumulator isolation is only required when accumulator pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed by the P/T limit curves provided in the PTLR.

WOG Insert 1

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Two or more [HPI] pumps capable of injecting into the RCS.	A.1	Initiate action to verify a maximum of [one] [HPI] pump is capable of injecting into the RCS.	Immediately

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.15 RCS Leakage Detection Instrumentation

LCO 3.4.15 The following RCS leakage detection instrumentation shall be OPERABLE:

a. One containment sump (level or discharge flow) monitor,

b. One containment atmosphere radioactivity monitor (gaseous or particulate), and

[c. One containment air cooler condensate flow rate monitor.]

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

ACTIONS

~~**- NOTE -**~~

~~LCO 3.0.4 is not applicable.~~

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Required containment sump monitor inoperable.	A.1	**- NOTE -** Not required until 12 hours after establishment of steady state operation. Perform SR 3.4.13.1.	Once per 24 hours
	AND		
	A.2	Restore required containment sump monitor to OPERABLE status.	30 days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.16 RCS Specific Activity

LCO 3.4.16 The specific activity of the reactor coolant shall be within limits.

APPLICABILITY: MODES 1 and 2,
MODE 3 with RCS average temperature (T_{avg}) ≥ 500°F.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. DOSE EQUIVALENT I-131 > 1.0 μCi/gm.		~~- NOTE - LCO 3.0.4 is not applicable.~~	Insert 7
	A.1	Verify DOSE EQUIVALENT I-131 within the acceptable region of Figure 3.4.16-1.	Once per 4 hours
	AND		
	A.2	Restore DOSE EQUIVALENT I-131 to within limit.	48 hours
B. Gross specific activity of the reactor coolant not within limit.	B.1	Be in MODE 3 with T_{avg} < 500°F.	6 hours

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.3 ECCS - Shutdown

LCO 3.5.3 One ECCS train shall be OPERABLE.

- NOTE -
An RHR train may be considered OPERABLE during alignment and operation for decay heat removal if capable of being manually realigned to the ECCS mode of operation.

APPLICABILITY: MODE 4.

WOG Insert 2

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. **[** Required ECCS residual heat removal (RHR) subsystem inoperable.	A.1	Initiate action to restore required ECCS RHR subsystem to OPERABLE status.	Immediately **]**
B. Required ECCS [high head subsystem] inoperable.	B.1	Restore required ECCS [high head subsystem] to OPERABLE status.	1 hour
C. Required Action and associated Completion Time [of Condition B] not met.	C.1	Be in MODE 5.	24 hours

3.6 CONTAINMENT SYSTEMS

3.6.8 Hydrogen Recombiners (Atmospheric, Subatmospheric, Ice Condenser, and Dual) (if permanently installed)

LCO 3.6.8 Two hydrogen recombiners shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One hydrogen recombiner inoperable.	A.1	~~- NOTE - LCO 3.0.4 is not applicable.~~ Restore hydrogen recombiner to OPERABLE status.	30 days
B. [Two hydrogen recombiners inoperable.	B.1	Verify by administrative means that the hydrogen control function is maintained.	1 hour <u>AND</u> Once per 12 hours thereafter
	<u>AND</u>		
	B.2	Restore one hydrogen recombiner to OPERABLE status.	7 days]
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours

3.6 CONTAINMENT SYSTEMS

3.6.9 Hydrogen Mixing System (HMS) (Atmospheric, Ice Condenser, and Dual)

LCO 3.6.9 [Two] HMS trains shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One HMS train inoperable.	A.1	~~- NOTE - LCO 3.0.4 is not applicable.~~ Restore HMS train to OPERABLE status.	 30 days
B. Two HMS trains inoperable.	B.1	Verify by administrative means that the hydrogen control function is maintained.	1 hour <u>AND</u> Once per 12 hours thereafter
	<u>AND</u>		
	B.2	Restore one HMS train to OPERABLE status.	7 days
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours

3.7 PLANT SYSTEMS

3.7.4 Atmospheric Dump Valves (ADVs)

LCO 3.7.4 [Three] ADV lines shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 when steam generator is relied upon for heat removal.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One required ADV line inoperable.	A.1	~~- NOTE - LCO 3.0.4 is not applicable.~~	
		Restore required ADV line to OPERABLE status.	7 days
B. Two or more required ADV lines inoperable.	B.1	Restore all but one ADV line to OPERABLE status.	24 hours
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
	AND		
	C.2	Be in MODE 4 without reliance upon steam generator for heat removal.	[24] hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.4.1	Verify one complete cycle of each ADV.	[18] months

3.7 PLANT SYSTEMS

3.7.5 Auxiliary Feedwater (AFW) System

LCO 3.7.5 [Three] AFW trains shall be OPERABLE.

- NOTE -
[Only one AFW train, which includes a motor driven pump, is required to be OPERABLE in MODE 4.]

APPLICABILITY: MODES 1, 2, and 3,
MODE 4 when steam generator is relied upon for heat removal.

WOG Insert 3

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. [One steam supply to turbine driven AFW pump inoperable. OR - NOTE - Only applicable if MODE 2 has not been entered following refueling. One turbine driven AFW pump inoperable in MODE 3 following refueling.	A.1 Restore affected equipment to OPERABLE status.	7 days AND 10 days from discovery of failure to meet the LCO]
B. One AFW train inoperable in MODE 1, 2 or 3 [for reasons other than Condition A].	B.1 Restore AFW train to OPERABLE status.	72 hours AND [10 days from discovery of failure to meet the LCO]

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources - Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System,

b. Two diesel generators (DGs) capable of supplying the onsite Class 1E power distribution subsystem(s), and

[c. Automatic load sequencers for Train A and Train B. **]**

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

WOG Insert 4

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One [required] offsite circuit inoperable.	A.1	Perform SR 3.8.1.1 for [required] OPERABLE offsite circuit.	1 hour <u>AND</u> Once per 8 hours thereafter
	<u>AND</u>		
	A.2	Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.	24 hours from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)
	<u>AND</u>		

BASES

LCO 3.0.3 (continued)

The time limits of LCO 3.0.3 allow 37 hours for the unit to be in MODE 5 when a shutdown is required during MODE 1 operation. If the unit is in a lower MODE of operation when a shutdown is required, the time limit for reaching the next lower MODE applies. If a lower MODE is reached in less time than allowed, however, the total allowable time to reach MODE 5, or other applicable MODE, is not reduced. For example, if MODE 3 is reached in 2 hours, then the time allowed for reaching MODE 4 is the next 11 hours, because the total time for reaching MODE 4 is not reduced from the allowable limit of 13 hours. Therefore, if remedial measures are completed that would permit a return to MODE 1, a penalty is not incurred by having to reach a lower MODE of operation in less than the total time allowed.

In MODES 1, 2, 3, and 4, LCO 3.0.3 provides actions for Conditions not covered in other Specifications. The requirements of LCO 3.0.3 do not apply in MODES 5 and 6 because the unit is already in the most restrictive Condition required by LCO 3.0.3. The requirements of LCO 3.0.3 do not apply in other specified conditions of the Applicability (unless in MODE 1, 2, 3, or 4) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken.

Exceptions to LCO 3.0.3 are provided in instances where requiring a unit shutdown, in accordance with LCO 3.0.3, would not provide appropriate remedial measures for the associated condition of the unit. An example of this is in LCO 3.7.15, "Fuel Storage Pool Water Level." LCO 3.7.15 has an Applicability of "During movement of irradiated fuel assemblies in the fuel storage pool." Therefore, this LCO can be applicable in any or all MODES. If the LCO and the Required Actions of LCO 3.7.15 are not met while in MODE 1, 2, or 3, there is no safety benefit to be gained by placing the unit in a shutdown condition. The Required Action of LCO 3.7.15 of "Suspend movement of irradiated fuel assemblies in the fuel storage pool" is the appropriate Required Action to complete in lieu of the actions of LCO 3.0.3. These exceptions are addressed in the individual Specifications.

LCO 3.0.4

Insert 3

~~LCO 3.0.4 establishes limitations on changes in MODES or other specified conditions in the Applicability when an LCO is not met. It precludes placing the unit in a MODE or other specified condition stated in that Applicability (e.g., Applicability desired to be entered) when the following exist:~~

~~a. Unit conditions are such that the requirements of the LCO would not be met in the Applicability desired to be entered and~~

BASES

LCO 3.0.4 (continued)

b. Continued noncompliance with the LCO requirements, if the Applicability were entered, would result in the unit being required to exit the Applicability desired to be entered to comply with the Required Actions.

Compliance with Required Actions that permit continued operation of the unit for an unlimited period of time in a MODE or other specified condition provides an acceptable level of safety for continued operation. This is without regard to the status of the unit before or after the MODE change. Therefore, in such cases, entry into a MODE or other specified condition in the Applicability may be made in accordance with the provisions of the Required Actions. The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before entering an associated MODE or other specified condition in the Applicability.

The provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that result from any unit shutdown.

Exceptions to LCO 3.0.4 are stated in the individual Specifications. These exceptions allow entry into MODES or other specified conditions in the Applicability when the associated ACTIONS to be entered do not provide for continued operation for an unlimited period of time. Exceptions may apply to all the ACTIONS or to a specific Required Action of a Specification.

LCO 3.0.4 is only applicable when entering MODE 4 from MODE 5, MODE 3 from MODE 4, MODE 2 from MODE 3, or MODE 1 from MODE 2. Furthermore, LCO 3.0.4 is applicable when entering any other specified condition in the Applicability only while operating in MODES 1, 2, 3, or 4. The requirements of LCO 3.0.4 do not apply in MODES 5 and 6, or in other specified conditions of the Applicability (unless in MODES 1, 2, 3, or 4) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken. **[** In some cases (e.g., ..) these ACTIONS provide a Note that states "While this LCO is not met, entry into a MODE or other specified condition in the Applicability is not permitted, unless required to comply with ACTIONS." This Note is a requirement explicitly precluding entry into a MODE or other specified condition of the Applicability. **]**

BASES

LCO 3.0.4 (continued)

~~Surveillances do not have to be performed on the associated inoperable equipment (or on variables outside the specified limits), as permitted by SR 3.0.1. Therefore, changing MODES or other specified conditions while in an ACTIONS Condition, in compliance with LCO 3.0.4 or where an exception to LCO 3.0.4 is stated, is not a violation of SR 3.0.1 or SR 3.0.4 for those Surveillances that do not have to be performed due to the associated inoperable equipment. However, SRs must be met to ensure OPERABILITY prior to declaring the associated equipment OPERABLE (or variable within limits) and restoring compliance with the affected LCO.~~

LCO 3.0.5

LCO 3.0.5 establishes the allowance for restoring equipment to service under administrative controls when it has been removed from service or declared inoperable to comply with ACTIONS. The sole purpose of this Specification is to provide an exception to LCO 3.0.2 (e.g., to not comply with the applicable Required Action(s)) to allow the performance of required testing to demonstrate either:

a. The OPERABILITY of the equipment being returned to service or

b. The OPERABILITY of other equipment.

The administrative controls ensure the time the equipment is returned to service in conflict with the requirements of the ACTIONS is limited to the time absolutely necessary to perform the required testing to demonstrate OPERABILITY. This Specification does not provide time to perform any other preventive or corrective maintenance.

An example of demonstrating the OPERABILITY of the equipment being returned to service is reopening a containment isolation valve that has been closed to comply with Required Actions and must be reopened to perform the required testing.

An example of demonstrating the OPERABILITY of other equipment is taking an inoperable channel or trip system out of the tripped condition to prevent the trip function from occurring during the performance of required testing on another channel in the other trip system. A similar example of demonstrating the OPERABILITY of other equipment is taking an inoperable channel or trip system out of the tripped condition to permit the logic to function and indicate the appropriate response during the performance of required testing on another channel in the same trip system.

BASES

SR 3.0.4

~~SR 3.0.4 establishes the requirement that all applicable SRs must be met before entry into a MODE or other specified condition in the Applicability.~~

~~This Specification ensures that system and component OPERABILITY requirements and variable limits are met before entry into MODES or other specified conditions in the Applicability for which these systems and components ensure safe operation of the unit.~~

~~The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or component to OPERABLE status before entering an associated MODE or other specified condition in the Applicability.~~

Insert 4

~~However, in certain circumstances, failing to meet an SR will not result in SR 3.0.4 restricting a MODE change or other specified condition change. When a system, subsystem, division, component, device, or variable is inoperable or outside its specified limits, the associated SR(s) are not required to be performed, per SR 3.0.1, which states that surveillances do not have to be performed on inoperable equipment.~~ When equipment is inoperable, SR 3.0.4 does not apply to the associated SR(s) since the requirement for the SR(s) to be performed is removed. Therefore, failing to perform the Surveillance(s) within the specified Frequency does not result in an SR 3.0.4 restriction to changing MODES or other specified conditions of the Applicability. However, since the LCO is not met in this instance, LCO 3.0.4 will govern any restrictions that may (or may not) apply to MODE or other specified condition changes.

~~The provisions of SR 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that result from any unit shutdown.~~

~~The precise requirements for performance of SRs are specified such that exceptions to SR 3.0.4 are not necessary. The specific time frames and conditions necessary for meeting the SRs are specified in the Frequency, in the Surveillance, or both. This allows performance of Surveillances when the prerequisite condition(s) specified in a Surveillance procedure require entry into the MODE or other specified condition in the Applicability of the associated LCO prior to the performance or completion of a Surveillance. A Surveillance that could not be performed until after entering the LCO Applicability, would have its Frequency specified such that it is not "due" until the specific conditions needed are met. Alternately, the Surveillance may be stated in the form of a Note as not required (to be met or performed) until a particular event, condition, or time has been reached. Further discussion of the specific formats of SRs' annotation is found in Section 1.4, Frequency.~~

BASES

SR 3.0.4 (continued)

~~SR 3.0.4 is only applicable when entering MODE 4 from MODE 5, MODE 3 from MODE 4, Mode 2 from MODE 3, or MODE 1 from MODE 2. Furthermore, SR 3.0.4 is applicable when entering any other specified condition in the Applicability only while operating in MODES 1, 2, 3, or 4. The requirements of SR 3.0.4 do not apply in MODES 5 and 6, or in other specified conditions of the Applicability (unless in MODES 1, 2, 3, or 4) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken.~~

REVISION HISTORY

REVISION	TSTF	DESCRIPTION	APPROVED
2.1	TSTF-358, R.6	Missed Surveillance Requirements	10/01/01

BASES

LCO (continued)

The AFW Flow to each SG is determined from a differential pressure measurement calibrated for a range of 0 gpm to 1200 gpm. Redundant monitoring capability is provided by two independent trains of instrumentation for each SG. Each differential pressure transmitter provides an input to a control room indicator and the unit computer. Since the primary indication used by the operator during an accident is the control room indicator, the PAM specification deals specifically with this portion of the instrument channel.

AFW flow is used three ways:

- to verify delivery of AFW flow to the SGs,
- to determine whether to terminate SI if still in progress, in conjunction with SG water level (narrow range), and
- to regulate AFW flow so that the SG tubes remain covered.

At some units, AFW flow is a Type A variable because operator action is required to throttle flow during an SLB accident to prevent the AFW pumps from operating in runout conditions. AFW flow is also used by the operator to verify that the AFW System is delivering the correct flow to each SG. However, the primary indication used by the operator to ensure an adequate inventory is SG level.

APPLICABILITY

The PAM instrumentation LCO is applicable in MODES 1, 2, and 3. These variables are related to the diagnosis and pre-planned actions required to mitigate DBAs. The applicable DBAs are assumed to occur in MODES 1, 2, and 3. In MODES 4, 5, and 6, unit conditions are such that the likelihood of an event that would require PAM instrumentation is low; therefore, the PAM instrumentation is not required to be OPERABLE in these MODES.

ACTIONS

~~Note 1 has been added in the ACTIONS to exclude the MODE change restriction of LCO 3.0.4. This exception allows entry into the applicable MODE while relying on the ACTIONS even though the ACTIONS may eventually require unit shutdown. This exception is acceptable due to the passive function of the instruments, the operator's ability to respond to an accident using alternate instruments and methods, and the low probability of an event requiring these instruments.~~

BASES

ACTIONS (continued)

A Note ~~2~~ has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed on Table 3.3.3-1. The Completion Time(s) of the inoperable channel(s) of a Function will be tracked separately for each Function starting from the time the Condition was entered for that Function.

A.1

Condition A applies when one or more Functions have one required channel that is inoperable. Required Action A.1 requires restoring the inoperable channel to OPERABLE status within 30 days. The 30 day Completion Time is based on operating experience and takes into account the remaining OPERABLE channel (or in the case of a Function that has only one required channel, other non-Regulatory Guide 1.97 instrument channels to monitor the Function), the passive nature of the instrument (no critical automatic action is assumed to occur from these instruments), and the low probability of an event requiring PAM instrumentation during this interval.

B.1

Condition B applies when the Required Action and associated Completion Time for Condition A are not met. This Required Action specifies initiation of actions in Specification 5.6.7, which requires a written report to be submitted to the NRC immediately. This report discusses the results of the root cause evaluation of the inoperability and identifies proposed restorative actions. This action is appropriate in lieu of a shutdown requirement since alternative actions are identified before loss of functional capability, and given the likelihood of unit conditions that would require information provided by this instrumentation.

C.1

Condition C applies when one or more Functions have two inoperable required channels (i.e., two channels inoperable in the same Function). Required Action C.1 requires restoring one channel in the Function(s) to OPERABLE status within 7 days. The Completion Time of 7 days is based on the relatively low probability of an event requiring PAM instrument operation and the availability of alternate means to obtain the required information. Continuous operation with two required channels inoperable in a Function is not acceptable because the alternate indications may not fully meet all performance qualification requirements

BASES

ACTIONS

~~Note 1 is included which excludes the MODE change restriction of LCO 3.0.4. This exception allows entry into an applicable MODE while relying on the ACTIONS even though the ACTIONS may eventually require a unit shutdown. This exception is acceptable due to the low probability of an event requiring the Remote Shutdown System and because the equipment can generally be repaired during operation without significant risk of spurious trip.~~

A Remote Shutdown System division is inoperable when each function is not accomplished by at least one designated Remote Shutdown System channel that satisfies the OPERABILITY criteria for the channel's Function. These criteria are outlined in the LCO section of the Bases.

A → Note ~~2~~ has been added to the ACTIONS to clarify the application of Completion Time rules. Separate Condition entry is allowed for each Function. The Completion Time(s) of the inoperable channel(s)/train(s) of a Function will be tracked separately for each Function starting from the time the Condition was entered for that Function.

A.1

Condition A addresses the situation where one or more required Functions of the Remote Shutdown System are inoperable. This includes the control and transfer switches for any required Function.

The Required Action is to restore the required Function to OPERABLE status within 30 days. The Completion Time is based on operating experience and the low probability of an event that would require evacuation of the control room.

B.1 and B.2

If the Required Action and associated Completion Time of Condition A is not met, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

BASES

APPLICABILITY

In MODES 1, 2, and 3, the PORV and its block valve are required to be OPERABLE to limit the potential for a small break LOCA through the flow path. The most likely cause for a PORV small break LOCA is a result of a pressure increase transient that causes the PORV to open. Imbalances in the energy output of the core and heat removal by the secondary system can cause the RCS pressure to increase to the PORV opening setpoint. The most rapid increases will occur at the higher operating power and pressure conditions of MODES 1 and 2. The PORVs are also required to be OPERABLE in MODES 1, 2, and 3 for manual actuation to mitigate a steam generator tube rupture event.

Pressure increases are less prominent in MODE 3 because the core input energy is reduced, but the RCS pressure is high. Therefore, the LCO is applicable in MODES 1, 2, and 3. The LCO is not applicable in MODES 4, 5, and 6 with the reactor vessel head in place when both pressure and core energy are decreased and the pressure surges become much less significant. LCO 3.4.12 addresses the PORV requirements in these MODES.

ACTIONS

Note 1 has been added to clarify that all pressurizer PORVs and block valves are treated as separate entities, each with separate Completion Times (i.e., the Completion Time is on a component basis). ~~The exception for LCO 3.0.4, Note 2, permits entry into MODES 1, 2, and 3 to perform cycling of the PORVs or block valves to verify their OPERABLE status in the event that testing was not satisfactorily performed in lower MODES.~~

- REVIEWER'S NOTE -

The bracketed options in Conditions B, C, E, and F are to accommodate plants with three PORVs and associated block valves.

A.1

PORVs may be inoperable and capable of being manually cycled (e.g., excessive seat leakage). In this condition, either the PORVs must be restored or the flow path isolated within 1 hour. The associated block valve is required to be closed, but power must be maintained to the associated block valve, since removal of power would render the block valve inoperable. This permits operation of the plant until the next refueling outage (MODE 6) so that maintenance can be performed on the PORVs to eliminate the problem condition.

BASES

LCO (continued)

[b. Two OPERABLE RHR suction relief valves,

An RHR suction relief valve is OPERABLE for LTOP when its RHR suction isolation valve and its RHR suction valve are open, its setpoint is at or between [436.5] psig and [463.5] psig, and testing has proven its ability to open at this setpoint.

c. One OPERABLE PORV and one OPERABLE RHR suction relief valve, or]

d. A depressurized RCS and an RCS vent.

An RCS vent is OPERABLE when open with an area of ≥ [2.07] square inches.

Each of these methods of overpressure prevention is capable of mitigating the limiting LTOP transient.

APPLICABILITY

This LCO is applicable in MODE 4 when any RCS cold leg temperature is ≤ [[ ]°F] [LTOP arming temperature specified in the PTLR], in MODE 5, and in MODE 6 when the reactor vessel head is on. The pressurizer safety valves provide overpressure protection that meets the Reference 1 P/T limits above [275°F] [LTOP arming temperature specified in the PTLR]. When the reactor vessel head is off, overpressurization cannot occur.

LCO 3.4.3 provides the operational P/T limits for all MODES.
LCO 3.4.10, "Pressurizer Safety Valves," requires the OPERABILITY of the pressurizer safety valves that provide overpressure protection during MODES 1, 2, and 3, and MODE 4 above [275°F] [LTOP arming temperature specified in the PTLR].

Low temperature overpressure prevention is most critical during shutdown when the RCS is water solid, and a mass or heat input transient can cause a very rapid increase in RCS pressure when little or no time allows operator action to mitigate the event.

ACTIONS

WOG Insert 1B

A.1 and [B.1]

With two or more HPI pumps capable of injecting into the RCS, RCS overpressurization is possible.

BASES

LCO (continued)

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the containment sump monitor, in combination with a gaseous or particulate radioactivity monitor [and a containment air cooler condensate flow rate monitor], provides an acceptable minimum.

APPLICABILITY

Because of elevated RCS temperature and pressure in MODES 1, 2, 3, and 4, RCS leakage detection instrumentation is required to be OPERABLE.

In MODE 5 or 6, the temperature is to be ≤ 200°F and pressure is maintained low or at atmospheric pressure. Since the temperatures and pressures are far lower than those for MODES 1, 2, 3, and 4, the likelihood of leakage and crack propagation are much smaller. Therefore, the requirements of this LCO are not applicable in MODES 5 and 6.

ACTIONS

~~The Actions are modified by a Note that indicates that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when the containment sump and required radiation monitors are inoperable. This allowance is provided because other instrumentation is available to monitor RCS LEAKAGE.~~

A.1 and A.2

With the required containment sump monitor inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere radioactivity monitor will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS water inventory balance, SR 3.4.13.1, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after establishing steady state operation (stable temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and [RCP seal injection and return flows]). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

Restoration of the required sump monitor to OPERABLE status within a Completion Time of 30 days is required to regain the function after the monitor's failure. This time is acceptable, considering the Frequency and

BASES

LCO

The specific iodine activity is limited to 1.0 μCi/gm DOSE EQUIVALENT I-131, and the gross specific activity in the reactor coolant is limited to the number of μCi/gm equal to 100 divided by Ē (average disintegration energy of the sum of the average beta and gamma energies of the coolant nuclides). The limit on DOSE EQUIVALENT I-131 ensures the 2 hour thyroid dose to an individual at the site boundary during the Design Basis Accident (DBA) will be a small fraction of the allowed thyroid dose. The limit on gross specific activity ensures the 2 hour whole body dose to an individual at the site boundary during the DBA will be a small fraction of the allowed whole body dose.

The SGTR accident analysis (Ref. 2) shows that the 2 hour site boundary dose levels are within acceptable limits. Violation of the LCO may result in reactor coolant radioactivity levels that could, in the event of an SGTR, lead to site boundary doses that exceed the 10 CFR 100 dose guideline limits.

APPLICABILITY

In MODES 1 and 2, and in MODE 3 with RCS average temperature ≥ 500°F, operation within the LCO limits for DOSE EQUIVALENT I-131 and gross specific activity are necessary to contain the potential consequences of an SGTR to within the acceptable site boundary dose values.

For operation in MODE 3 with RCS average temperature < 500°F, and in MODES 4 and 5, the release of radioactivity in the event of a SGTR is unlikely since the saturation pressure of the reactor coolant is below the lift pressure settings of the main steam safety valves.

ACTIONS

A.1 and A.2

With the DOSE EQUIVALENT I-131 greater than the LCO limit, samples at intervals of 4 hours must be taken to demonstrate that the limits of Figure 3.4.16-1 are not exceeded. The Completion Time of 4 hours is required to obtain and analyze a sample. Sampling is done to continue to provide a trend.

The DOSE EQUIVALENT I-131 must be restored to within limits within 48 hours. The Completion Time of 48 hours is required, if the limit violation resulted from normal iodine spiking.

Insert B

~~A Note to the Required Action of Condition A excludes the MODE change restriction of LCO 3.0.4. This exception allows entry into the applicable MODE(S) while relying on the ACTIONS even though the ACTIONS may eventually require plant shutdown.~~ This exception is acceptable due to

allowance

BASES

LCO (continued)

take its supply from the containment sump and to deliver its flow to the RCS hot and cold legs.

This LCO is modified by a Note that allows an RHR train to be considered OPERABLE during alignment and operation for decay heat removal, if capable of being manually realigned (remote or local) to the ECCS mode of operation and not otherwise inoperable. This allows operation in the RHR mode during MODE 4.

APPLICABILITY

In MODES 1, 2, and 3, the OPERABILITY requirements for ECCS are covered by LCO 3.5.2.

In MODE 4 with RCS temperature below 350°F, one OPERABLE ECCS train is acceptable without single failure consideration, on the basis of the stable reactivity of the reactor and the limited core cooling requirements.

In MODES 5 and 6, plant conditions are such that the probability of an event requiring ECCS injection is extremely low. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops - MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops - MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.5, "Residual Heat Removal (RHR) and Coolant Circulation - High Water Level," and LCO 3.9.6, "Residual Heat Removal (RHR) and Coolant Circulation - Low Water Level."

ACTIONS

WOG Insert 2B

A.1

With no ECCS RHR subsystem OPERABLE, the plant is not prepared to respond to a loss of coolant accident or to continue a cooldown using the RHR pumps and heat exchangers. The Completion Time of immediately to initiate actions that would restore at least one ECCS RHR subsystem to OPERABLE status ensures that prompt action is taken to restore the required cooling capacity. Normally, in MODE 4, reactor decay heat is removed from the RCS by an RHR loop. If no RHR loop is OPERABLE for this function, reactor decay heat must be removed by some alternate method, such as use of the steam generators. The alternate means of heat removal must continue until the inoperable RHR loop components can be restored to operation so that decay heat removal is continuous.

With both RHR pumps and heat exchangers inoperable, it would be unwise to require the plant to go to MODE 5, where the only available heat removal system is the RHR. Therefore, the appropriate action is to

BASES

APPLICABILITY

In MODES 1 and 2, two hydrogen recombiners are required to control the hydrogen concentration within containment below its flammability limit of 4.1 v/o following a LOCA, assuming a worst case single failure.

In MODES 3 and 4, both the hydrogen production rate and the total hydrogen produced after a LOCA would be less than that calculated for the DBA LOCA. Also, because of the limited time in these MODES, the probability of an accident requiring the hydrogen recombiners is low. Therefore, the hydrogen recombiners are not required in MODE 3 or 4.

In MODES 5 and 6, the probability and consequences of a LOCA are low, due to the pressure and temperature limitations in these MODES. Therefore, hydrogen recombiners are not required in these MODES.

ACTIONS

A.1

With one containment hydrogen recombiner inoperable, the inoperable recombiner must be restored to OPERABLE status within 30 days. In this condition, the remaining OPERABLE hydrogen recombiner is adequate to perform the hydrogen control function. However, the overall reliability is reduced because a single failure in the OPERABLE recombiner could result in reduced hydrogen control capability. The 30 day Completion Time is based on the availability of the other hydrogen recombiner, the small probability of a LOCA or SLB occurring (that would generate an amount of hydrogen that exceeds the flammability limit), and the amount of time available after a LOCA or SLB (should one occur) for operator action to prevent hydrogen accumulation from exceeding the flammability limit.

~~Required Action A.1 has been modified by a Note that states the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when one recombiner is inoperable. This allowance is based on the availability of the other hydrogen recombiner, the small probability of a LOCA or SLB occurring (that would generate an amount of hydrogen that exceeds the flammability limit), and the amount of time available after a LOCA or SLB (should one occur) for operator action to prevent hydrogen accumulation from exceeding the flammability limit.~~

BASES

APPLICABILITY

In MODES 1 and 2, the two HMS trains ensure the capability to prevent localized hydrogen concentrations above the flammability limit of 4.1 volume percent in containment assuming a worst case single active failure.

In MODE 3 or 4, both the hydrogen production rate and the total hydrogen produced after a LOCA would be less than that calculated for the DBA LOCA. Also, because of the limited time in these MODES, the probability of an accident requiring the HMS is low. Therefore, the HMS is not required in MODE 3 or 4.

In MODES 5 and 6, the probability and consequences of a LOCA or steam line break (SLB) are reduced due to the pressure and temperature limitations in these MODES. Therefore, the HMS is not required in these MODES.

ACTIONS

A.1

With one HMS train inoperable, the inoperable train must be restored to OPERABLE status within 30 days. In this Condition, the remaining OPERABLE HMS train is adequate to perform the hydrogen mixing function. However, the overall reliability is reduced because a single failure in the OPERABLE train could result in reduced hydrogen mixing capability. The 30 day Completion Time is based on the availability of the other HMS train, the small probability of a LOCA or SLB occurring (that would generate an amount of hydrogen that exceeds the flammability limit), the amount of time available after a LOCA or SLB (should one occur) for operator action to prevent hydrogen accumulation from exceeding the flammability limit, and the availability of the hydrogen recombiners, Containment Spray System, Hydrogen Purge System, and hydrogen monitors.

~~Required Action A.1 has been modified by a Note that states the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when one HMS train is inoperable. This allowance is based on the availability of the other HMS train, the small probability of a LOCA or SLB occurring (that would generate an amount of hydrogen that exceeds the flammability limit), and the amount of time available after a LOCA or SLB (should one occur) for operator action to prevent hydrogen accumulation from exceeding the flammability limit.~~

BASES

ACTIONS

A.1

With one required ADV line inoperable, action must be taken to restore OPERABLE status within 7 days. The 7 day Completion Time allows for the redundant capability afforded by the remaining OPERABLE ADV lines, a nonsafety grade backup in the Steam Bypass System, and MSSVs. Required Action A.1 is modified by a Note indicating that LCO 3.0.4 does not apply.

B.1

With two or more ADV lines inoperable, action must be taken to restore all but one ADV line to OPERABLE status. Since the block valve can be closed to isolate an ADV, some repairs may be possible with the unit at power. The 24 hour Completion Time is reasonable to repair inoperable ADV lines, based on the availability of the Steam Bypass System and MSSVs, and the low probability of an event occurring during this period that would require the ADV lines.

C.1 and C.2

If the ADV lines cannot be restored to OPERABLE status within the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours, and in MODE 4, without reliance upon steam generator for heat removal, within [24] hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.4.1

To perform a controlled cooldown of the RCS, the ADVs must be able to be opened either remotely or locally and throttled through their full range. This SR ensures that the ADVs are tested through a full control cycle at least once per fuel cycle. Performance of inservice testing or use of an ADV during a unit cooldown may satisfy this requirement. Operating experience has shown that these components usually pass the Surveillance when performed at the [18] month Frequency. The Frequency is acceptable from a reliability standpoint.

BASES

APPLICABILITY

In MODES 1, 2, and 3, the AFW System is required to be OPERABLE in the event that it is called upon to function when the MFW is lost. In addition, the AFW System is required to supply enough makeup water to replace the steam generator secondary inventory, lost as the unit cools to MODE 4 conditions.

In MODE 4 the AFW System may be used for heat removal via the steam generators.

In MODE 5 or 6, the steam generators are not normally used for heat removal, and the AFW System is not required.

ACTIONS

WOG Insert 3B

[A.1

If one of the two steam supplies to the turbine driven AFW train is inoperable, or if a turbine driven pump is inoperable while in MODE 3 immediately following refueling, action must be taken to restore the inoperable equipment to an OPERABLE status within 7 days. The 7 day Completion Time is reasonable, based on the following reasons:

a. For the inoperability of a steam supply to the turbine driven AFW pump, the 7 day Completion Time is reasonable since there is a redundant steam supply line for the turbine driven pump.

b. For the inoperability of a turbine driven AFW pump while in MODE 3 immediately subsequent to a refueling, the 7 day Completion Time is reasonable due to the minimal decay heat levels in this situation.

c. For both the inoperability of a steam supply line to the turbine driven pump and an inoperable turbine driven AFW pump while in MODE 3 immediately following a refueling outage, the 7 day Completion Time is reasonable due to the availability of redundant OPERABLE motor driven AFW pumps, and due to the low probability of an event requiring the use of the turbine driven AFW pump.

The second Completion Time for Required Action A.1 establishes a limit on the maximum time allowed for any combination of Conditions to be inoperable during any continuous failure to meet this LCO.

The 10 day Completion Time provides a limitation time allowed in this specified Condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The AND connector between 7 days and 10 days

BASES

LCO (continued)

The AC sources in one train must be separate and independent (to the extent possible) of the AC sources in the other train. For the DGs, separation and independence are complete.

For the offsite AC sources, separation and independence are to the extent practical. A circuit may be connected to more than one ESF bus, with fast transfer capability to the other circuit OPERABLE, and not violate separation criteria. A circuit that is not connected to an ESF bus is required to have OPERABLE fast transfer interlock mechanisms to at least two ESF buses to support OPERABILITY of that circuit.

APPLICABILITY

The AC sources [and sequencers] are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The AC power requirements for MODES 5 and 6 are covered in LCO 3.8.2, "AC Sources - Shutdown."

ACTIONS

WOG Insert 4B

A.1

To ensure a highly reliable power source remains with one offsite circuit inoperable, it is necessary to verify the OPERABILITY of the remaining required offsite circuit on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However, if a second required circuit fails SR 3.8.1.1, the second offsite circuit is inoperable, and Condition C, for two offsite circuits inoperable, is entered.

- REVIEWER'S NOTE -

The turbine driven auxiliary feedwater pump is only required to be considered a redundant required feature, and, therefore, required to be determined OPERABLE by this Required Action, if the design is such that the remaining OPERABLE motor or turbine driven auxiliary feedwater pump(s) is not by itself capable (without any reliance on the motor driven

3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY

LCO 3.0.1

LCOs shall be met during the MODES or other specified conditions in the Applicability, except as provided in LCO 3.0.2 and LCO 3.0.7.

LCO 3.0.2

Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met, except as provided in LCO 3.0.5 and LCO 3.0.6.

If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required, unless otherwise stated.

LCO 3.0.3

When an LCO is not met and the associated ACTIONS are not met, an associated ACTION is not provided, or if directed by the associated ACTIONS, the unit shall be placed in a MODE or other specified condition in which the LCO is not applicable. Action shall be initiated within 1 hour to place the unit, as applicable, in:

a. MODE 3 within 7 hours,

b. [MODE 4 within 13] hours, and

c. MODE 5 within 37 hours.

Exceptions to this Specification are stated in the individual Specifications.

Where corrective measures are completed that permit operation in accordance with the LCO or ACTIONS, completion of the actions required by LCO 3.0.3 is not required.

LCO 3.0.3 is only applicable in MODES 1, 2, 3, and 4.

LCO 3.0.4

Insert 1

~~When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time. This Specification shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.~~

~~Exceptions to this Specification are stated in the individual Specifications.~~

~~LCO 3.0.4 is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4.~~

3.0 LCO Applicability

LCO 3.0.4 (continued)

~~**- REVIEWER'S NOTE -**~~

~~LCO 3.0.4 has been revised so that changes in MODES or other specified conditions in the Applicability that are part of a shutdown of the unit shall not be prevented. In addition, LCO 3.0.4 has been revised so that it is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4. The MODE change restrictions in LCO 3.0.4 were previously applicable in all MODES. Before this version of LCO 3.0.4 can be implemented on a plant-specific basis, the licensee must review the existing technical specifications to determine where specific restrictions on MODE changes or Required Actions should be included in individual LCOs to justify this change; such an evaluation should be summarized in a matrix of all existing LCOs to facilitate NRC staff review of a conversion to the STS.~~

LCO 3.0.5 Equipment removed from service or declared inoperable to comply with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment. This is an exception to LCO 3.0.2 for the system returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.

LCO 3.0.6 When a supported system LCO is not met solely due to a support system LCO not being met, the Conditions and Required Actions associated with this supported system are not required to be entered. Only the support system LCO ACTIONS are required to be entered. This is an exception to LCO 3.0.2 for the supported system. In this event, an evaluation shall be performed in accordance with Specification 5.5.15, "Safety Function Determination Program (SFDP)." If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

When a support system's Required Action directs a supported system to be declared inoperable or directs entry into Conditions and Required Actions for a supported system, the applicable Conditions and Required Actions shall be entered in accordance with LCO 3.0.2.

LCO 3.0.7 Special test exception (STE) LCOs [in each applicable LCO section] allow specified Technical Specifications (TS) requirements to be changed to permit performance of special tests and operations. Unless otherwise specified, all other TS requirements remain unchanged. Compliance with

3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

SR 3.0.1

SRs shall be met during the MODES or other specified conditions in the Applicability for individual LCOs, unless otherwise stated in the SR. Failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO. Failure to perform a Surveillance within the specified Frequency shall be failure to meet the LCO except as provided in SR 3.0.3. Surveillances do not have to be performed on inoperable equipment or variables outside specified limits.

SR 3.0.2

The specified Frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency, as measured from the previous performance or as measured from the time a specified condition of the Frequency is met.

For Frequencies specified as "once," the above interval extension does not apply.

If a Completion Time requires periodic performance on a "once per . . ." basis, the above Frequency extension applies to each performance after the initial performance.

Exceptions to this Specification are stated in the individual Specifications.

SR 3.0.3

If it is discovered that a Surveillance was not performed within its specified Frequency, then compliance with the requirement to declare the LCO not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified Frequency, whichever is greater. This delay period is permitted to allow performance of the Surveillance. A risk evaluation shall be performed for any Surveillance delayed greater than 24 hours and the risk impact shall be managed.

If the Surveillance is not performed within the delay period, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.

When the Surveillance is performed within the delay period and the Surveillance is not met, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.

SR 3.0.4

Insert 2

~~Entry into a MODE or other specified condition in the Applicability of an LCO shall not be made unless the LCO's Surveillances have been met within their specified Frequency. This provision shall not prevent entry into~~

3.0 SR Applicability

SR 3.0.4 (continued)

MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

SR 3.0.4 is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4.

- REVIEWER'S NOTE -

SR 3.0.4 has been revised so that changes in MODES or other specified conditions in the Applicability that are part of a shutdown of the unit shall not be prevented. In addition, SR 3.0.4 has been revised so that it is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4. The MODE change restrictions in SR 3.0.4 were previously applicable in all MODES. Before this version of SR 3.0.4 can be implemented on a plant-specific basis, the licensee must review the existing technical specifications to determine where specific restrictions on MODE changes or Required Actions should be included in individual LCOs to justify this change; such an evaluation should be summarized in a matrix of all existing LCOs to facilitate NRC staff review of a conversion to the STS.

3.3 INSTRUMENTATION

3.3.1 Reactor Protective System (RPS) Instrumentation - Operating (Analog)

LCO 3.3.1 Four RPS trip units and associated instrument and bypass removal channels for each Function in Table 3.3.1-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.1-1.

ACTIONS

- NOTE -
Separate Condition entry is allowed for each RPS Function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one RPS trip unit or associated instrument channel inoperable except for Condition C (excore channel not calibrated with incore detectors).	A.1 Place affected trip unit in bypass or trip.	1 hour
	AND	
	A.2.1 Restore channel to OPERABLE status.	[48] hours
	OR	
	A.2.2 [Place affected tripunit in trip.	48 hours]
B. One or more Functions with two RPS trip units or associated instrument channels inoperable except for Condition C (excore channel not calibrated with incore detectors).	~~- NOTE - LCO 3.0.4 is not applicable.~~	
	B.1 Place one trip unit in bypass and place the other trip unit in trip.	1 hour
	AND	
	B.2 Restore one trip unit to OPERABLE status.	[48] hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. One or more Functions with one or more power range excore channels not calibrated with the incore detectors.	C.1	Perform SR 3.3.1.3.	24 hours
	<u>OR</u>		
	C.2	Restrict THERMAL POWER to ≤ 90% RTP.	24 hours
D. One or more Functions with one automatic bypass removal channel inoperable.	D.1	Disable bypass channel.	1 hour
	<u>OR</u>		
	D.2.1	Place affected trip units in bypass or trip.	1 hour
	<u>AND</u>		
	D.2.2.1	Restore bypass removal channel and affected trip units to OPERABLE status.	[48] hours
	<u>OR</u>		
	D.2.2.2	**[** Place affected trip units in trip.	48 hours **]**
E. One or more Functions with two automatic bypass removal channels inoperable.		~~- NOTE - LCO 3.0.4 is not applicable.~~	
	E.1	Disable bypass channels.	1 hour
	<u>OR</u>		

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Two Power Rate of Change - High trip units or associated instrument channel inoperable.	~~- NOTE - LCO 3.0.4 is not applicable.~~	
	B.1 Place one trip unit in bypass and place the other trip unit in trip.	1 hour
	AND	
	B.2 [Restore one trip unitto OPERABLE status.	48 hours]
C. One automatic bypass removal channel inoperable.	C.1 Disable bypass channel.	1 hour
	OR	
	C.2.1 Place affected trip unit in bypass or trip.	1 hour
	AND	
	C.2.2.1 Restore bypass removal channel and affected trip unit to OPERABLE status.	[48] hours
	OR	
	C.2.2.2 [Place affected tripunits in trip.	48 hours]
D. Two automatic bypass removal channels inoperable.	~~- NOTE - LCO 3.0.4 is not applicable.~~	
	D.1 Disable bypass channels.	1 hour
	OR	

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
C. One or more Functions with two ESFAS trip units or associated instrument channels (except CSAS) inoperable.		~~- NOTE - LCO 3.0.4 is not applicable.~~	
	C.1	Place one trip unit in bypass and place the other trip unit in trip.	1 hour
	AND		
	C.2	Restore one trip unit to OPERABLE status.	[48] hours
D. One or more Functions with one automatic bypass removal channel inoperable.	D.1	Disable bypass channel.	1 hour
	OR		
	D.2.1	Place affected trip units in bypass or trip.	1 hour
	AND		
	D.2.2.1	Restore bypass removal channel and affected trip units to OPERABLE status.	[48] hours
	OR		
	D.2.2.2	**[** Place affected trip units in trip.	48 hours **]**
E. One or more Functions with two automatic bypass removal channels inoperable.		~~- NOTE - LCO 3.0.4 is not applicable.~~	
	E.1	Disable bypass channels.	1 hour
	OR		

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
	B.2.1	~~- NOTE - LCO 3.0.4 is not applicable.~~ Place one channel in bypass and the other channel in trip.	 1 hour
	AND		
	B.2.2	Restore one channel to OPERABLE status.	[48] hours
C. One or more Functions with more than two channels inoperable.	C.1	Restore all but two channels to OPERABLE status.	1 hour
D. Required Action and associated Completion Time not met.	D.1	Enter applicable Conditions and Required Actions for the associated DG made inoperable by DG - LOVS instrumentation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.6.1	[Perform CHANNEL CHECK.	12 hours]
SR 3.3.6.2	Perform CHANNEL FUNCTIONAL TEST.	[92] days

3.3 INSTRUMENTATION

3.3.9 Chemical and Volume Control System (CVCS) Isolation Signal (Analog)

LCO 3.3.9 Four channels of West Penetration Room/Letdown Heat Exchanger Room pressure sensing and two Actuation Logic channels shall be OPERABLE.

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

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One Actuation Logic channel inoperable.	A.1 Restore the channel to OPERABLE status.	48 hours
B. One CVCS isolation instrument channel inoperable.	B.1 Place the channel in bypass or trip.	1 hour
	AND	
	B.2.1 Restore the channel to OPERABLE status.	48 hours
	OR	
	B.2.2 Place the channel in trip.	48 hours
C. Two CVCS isolation instrument channels inoperable.	~~- NOTE - LCO 3.0.4 is not applicable.~~	
	C.1 Place one channel in bypass and place the other channel in trip.	1 hour
	AND	
	C.2 Restore one channel to OPERABLE status.	48 hours

3.3 INSTRUMENTATION

3.3.11 Post Accident Monitoring (PAM) Instrumentation (Analog)

LCO 3.3.11 The PAM instrumentation for each Function in Table 3.3.11-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

- NOTES -

1. ~~LCO 3.0.4 is not applicable.~~
2. Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more Functions with one required channel inoperable.	A.1	Restore required channel to OPERABLE status.	30 days
B. Required Action and associated Completion Time of Condition A not met.	B.1	Initiate action in accordance with Specification 5.6.7.	Immediately
C. ----- **- NOTE -** Not applicable to hydrogen monitor channels. ----- One or more Functions with two required channels inoperable.	C.1	Restore one channel to OPERABLE status.	7 days
D. Two hydrogen monitor channels inoperable.	D.1	Restore one hydrogen monitor channel to OPERABLE status.	72 hours

3.3 INSTRUMENTATION

3.3.12 Remote Shutdown System (Analog)

LCO 3.3.12 The Remote Shutdown System Functions shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

- NOTES -

1. LCO 3.0.4 ~~is not~~ applicable.
2. Separate Condition entry is allowed for each Function.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required Functions inoperable.	A.1 Restore required Functions to OPERABLE status.	30 days
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	6 hours [12] hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.12.1	[Perform CHANNEL CHECK for each required instrumentation channel that is normally energized.	31 days]
SR 3.3.12.2	Verify each required control circuit and transfer switch is capable of performing the intended function.	[18] months

3.3 INSTRUMENTATION

3.3.1 Reactor Protective System (RPS) Instrumentation - Operating (Digital)

LCO 3.3.1 Four RPS trip and bypass removal channels for each Function in Table 3.3.1-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.1-1.

ACTIONS

- NOTE -
Separate Condition entry is allowed for each RPS Function.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more Functions with one automatic RPS trip channel inoperable.	A.1	Place channel in bypass or trip.	1 hour
	AND		
	A.2	Restore channel to OPERABLE status.	Prior to entering MODE 2 following next MODE 5 entry
B. One or more Functions with two automatic RPS trip channels inoperable.	B.1	~~- NOTE - LCO 3.0.4 is not applicable.~~	
		Place one channel in bypass and the other in trip.	1 hour
C. One or more Functions with one automatic bypass removal channel inoperable.	C.1	Disable bypass channel.	1 hour
	OR		

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
	C.2.1	Place affected automatic trip channel in bypass or trip.	1 hour
	AND		
	C.2.2	Restore bypass removal channel and associated automatic trip channel to OPERABLE status.	Prior to entering MODE 2 following next MODE 5 entry
D. One or more Functions with two automatic bypass removal channels inoperable.		~~- NOTE - LCO 3.0.4 is not applicable.~~	
	D.1	Disable bypass channels.	1 hour
	OR		
	D.2	Place one affected automatic trip channel in bypass and place the other in trip.	1 hour
E. One or more core protection calculator (CPC) channels with a cabinet high temperature alarm.	E.1	Perform CHANNEL FUNCTIONAL TEST on affected CPC.	12 hours
F. One or more CPC channels with three or more autorestarts during a 12 hour period.	F.1	Perform CHANNEL FUNCTIONAL TEST on affected CPC.	24 hours
G. Required Action and associated Completion Time not met.	G.1	Be in MODE 3.	6 hours

3.3 INSTRUMENTATION

3.3.2 Reactor Protective System (RPS) Instrumentation - Shutdown (Digital)

LCO 3.3.2 Four RPS Logarithmic Power Level - High trip channels and associated instrument and bypass removal channels shall be OPERABLE.

APPLICABILITY: MODES 3, 4, and 5, with any reactor trip circuit breakers (RTCBs) closed and any control element assembly capable of being withdrawn.

- NOTE -

Bypass may be enabled when logarithmic power is > [1E-4]% and shall be capable of automatic removal whenever logarithmic power is > [1E-4]%. Bypass shall be removed prior to reducing logarithmic power to a value ≤ [1E-4]%. Trip may be manually bypassed during physics testing pursuant to LCO 3.4.17, "RCS Loops - Test Exceptions."

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One RPS logarithmic power level trip channel inoperable.	A.1	Place channel in bypass or trip.	1 hour
	<u>AND</u>		
	A.2	Restore channel to OPERABLE status.	Prior to entering MODE 2 following next MODE 5 entry
B. Two RPS logarithmic power level trip channels inoperable.	B.1	~~- NOTE - LCO 3.0.4 is not applicable.~~	
		Place one channel in bypass and place the other in trip.	1 hour

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One automatic bypass removal channel inoperable.	C.1 Disable bypass channel. <u>OR</u> C.2.1 Place affected automatic trip channel in bypass or trip. <u>AND</u> C.2.2 Restore bypass removal channel and associated automatic trip channel to OPERABLE status.	1 hour 1 hour Prior to entering MODE 2 following next MODE 5 entry
D. Two automatic bypass removal channels inoperable.	~~- NOTE -~~ ~~LCO 3.0.4 is not applicable.~~ D.1 Disable bypass channels. <u>OR</u> D.2 Place one affected automatic trip channel in bypass and place the other in trip.	 1 hour 1 hour
E. Required Action and associated Completion Time not met.	E.1 Open all RTCBs.	1 hour

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.2.1	Perform a CHANNEL CHECK of each logarithmic power channel.	12 hours

3.3 INSTRUMENTATION

3.3.5 Engineered Safety Features Actuation System (ESFAS) Instrumentation (Digital)

LCO 3.3.5 Four ESFAS trip and bypass removal channels for each Function in Table 3.3.5-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.5-1.

ACTIONS

- NOTE -
Separate Condition entry is allowed for each ESFAS Function.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more Functions with one automatic ESFAS trip channel inoperable.	A.1	Place channel in bypass or trip.	1 hour
	AND		
	A.2	Restore channel to OPERABLE status.	Prior to entering MODE 2 following next MODE 5 entry
B. One or more Functions with two automatic ESFAS trip channels inoperable.	B.1	~~- NOTE - LCO 3.0.4 is not applicable.~~	
		Place one channel in bypass and the other in trip.	1 hour
C. One or more Functions with one automatic bypass removal channel inoperable.	C.1	Disable bypass channel.	1 hour
	OR		

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
	C.2.1	Place affected automatic trip channel in bypass or trip.	1 hour
	<u>AND</u>		
	C.2.2	Restore bypass removal channel and associated automatic trip channel to OPERABLE status.	Prior to entering MODE 2 following next MODE 5 entry
D. One or more Functions with two automatic bypass removal channels inoperable.		~~**- NOTE -** LCO 3.0.4 is not applicable.~~	
	D.1	Disable bypass channels.	1 hour
	<u>OR</u>		
	D.2	Place one affected automatic trip channel in bypass and place the other in trip.	1 hour
E. Required Action and associated Completion Time not met.	E.1	Be in MODE 3.	6 hours
	<u>AND</u>		
	E.2	Be in MODE 4.	[12] hours

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
	B.2	~~- NOTE -~~ ~~LCO 3.0.4 is not applicable.~~ Place one channel in bypass and the other channel in trip.	 1 hour
C. One or more Functions with more than two channels inoperable.	C.1	Restore all but two channels to OPERABLE status.	1 hour
D. Required Action and associated Completion Time not met.	D.1	Enter applicable Conditions and Required Actions for the associated DG made inoperable by DG - LOVS instrumentation.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.7.1	[Perform CHANNEL CHECK.	12 hours]
SR 3.3.7.2	Perform CHANNEL FUNCTIONAL TEST.	[92] days

3.3 INSTRUMENTATION

3.3.11 Post Accident Monitoring (PAM) Instrumentation (Digital)

LCO 3.3.11 The PAM instrumentation for each Function in Table 3.3.11-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.
During movement of [recently] irradiated fuel assemblies.

ACTIONS

- NOTES -

1. ~~LCO 3.0.4 not applicable.~~
2. Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more Functions with one required channel inoperable.	A.1	Restore required channel to OPERABLE status.	30 days
B. Required Action and associated Completion Time of Condition A not met.	B.1	Initiate action in accordance with Specification 5.6.7.	Immediately
C. ----- **- NOTE -** Not applicable to hydrogen monitor channels. ----- One or more Functions with two required channels inoperable.	C.1	Restore one channel to OPERABLE status.	7 days
D. Two hydrogen monitor channels inoperable.	D.1	Restore one hydrogen monitor channel to OPERABLE status.	72 hours

3.3 INSTRUMENTATION

3.3.12 Remote Shutdown System (Digital)

LCO 3.3.12 The Remote Shutdown System Functions shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

Editorial Change

- NOTES -

1. LCO 3.0.4 is not applicable.
2. Separate Condition entry is allowed for each Function.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required Functions inoperable.	A.1 Restore required Functions to OPERABLE status.	30 days
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. <u>AND</u> B.2 Be in MODE 4.	6 hours [12] hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.12.1	**[** Perform CHANNEL CHECK for each required instrumentation channel that is normally energized.	31 days **]**
SR 3.3.12.2	Verify each required control circuit and transfer switch is capable of performing the intended function.	[18] months

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.11 Pressurizer Power Operated Relief Valves (PORVs)

LCO 3.4.11 Each PORV and associated block valve shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

- NOTES -

1. Separate Condition entry is allowed for each PORV and each block valve.

2. LCO 3.0.4 is not applicable.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more PORVs inoperable and capable of being manually cycled.	A.1	Close and maintain power to associated block valve.	1 hour
B. One PORV inoperable and not capable of being manually cycled.	B.1	Close associated block valve.	1 hour
	AND		
	B.2	Remove power from associated block valve.	1 hour
	AND		
	B.3	Restore PORV to OPERABLE status.	72 hours
C. One block valve inoperable.	C.1	Place associated PORV in manual control.	1 hour
	AND		

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.12 Low Temperature Overpressure Protection (LTOP) System

LCO 3.4.12

An LTOP System shall be OPERABLE with a maximum of one high pressure safety injection (HPSI) pump and one charging pump capable of injecting into the RCS and the safety injection tanks (SITs) isolated, and either:

- NOTES -

1. [Two charging pumps] may be made capable of injecting for ≤ 1 hour for pump swap operations.

2. SIT may be unisolated when SIT pressure is less than the maximum RCS pressure for the existing RCS cold leg temperature allowed by the P/T limit curves provided in the PTLR.

---

a. Two OPERABLE power operated relief valves (PORVs) with lift settings ≤ [450] psig or

b. The RCS depressurized and an RCS vent of ≥ [1.3] square inches.

APPLICABILITY:

MODE 4 when any RCS cold leg temperature is ≤ [285]°F,
MODE 5,
MODE 6 when the reactor vessel head is on.

CEOG Insert 1

ACTIONS

(S)

- NOTE -

1. SIT isolation is only required when SIT pressure is greater than or equal to the maximum RCS pressure for the existing RCS cold leg temperature allowed by the P/T limit curves provided in the PTLR.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Two or more HPSI pumps capable of injecting into the RCS.	A.1	Initiate action to verify a maximum of one HPSI pump capable of injecting into the RCS.	Immediately

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.15 RCS Leakage Detection Instrumentation

LCO 3.4.15 [Two of] the following RCS leakage detection instrumentation shall be OPERABLE:

a. One containment sump monitor,

b. One containment atmosphere radioactivity monitor (gaseous or particulate), and

[c. One containment air cooler condensate flow rate monitor. **]**

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

ACTIONS

- NOTE -

LCO 3.0.4 is not applicable.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Required containment sump monitor inoperable. OR Required containment air cooler flow rate monitor inoperable.]	A.1	------------------- **- NOTE -** Not required until 12 hours after establishment of steady state operation. ------------------- Perform SR 3.4.13.1.	Once per 24 hours
	AND		
	A.2	Restore containment sump monitor to OPERABLE status.	30 days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.16 RCS Specific Activity

LCO 3.4.16 The specific activity of the reactor coolant shall be within limits.

APPLICABILITY: MODES 1 and 2,
MODE 3 with RCS average temperature (T_{avg}) ≥ 500°F.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. DOSE EQUIVALENT I-131 > 1.0 μCi/gm.	~~- NOTE - LCO 3.0.4 is not applicable.~~	Insert 7
	A.1 Verify DOSE EQUIVALENT I-131 within the acceptable region of Figure 3.4.16-1.	Once per 4 hours
	AND	
	A.2 Restore DOSE EQUIVALENT I-131 to within limit.	48 hours
B. Required Action and associated Completion Time of Condition A not met. OR DOSE EQUIVALENT I-131 in the unacceptable region of Figure 3.4.16-1.	B.1 Be in MODE 3 with T_{avg} < 500°F.	6 hours

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.3 ECCS - Shutdown

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

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

CEOG Insert 2

ACTIONS

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

SURVEILLANCE REQUIREMENTS

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

3.6 CONTAINMENT SYSTEMS

3.6.8 Hydrogen Recombiners (Atmospheric and Dual) (if permanently installed)

LCO 3.6.8 [Two] hydrogen recombiners shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One hydrogen recombiner inoperable.	A.1	~~- NOTE - LCO 3.0.4 is not applicable.~~ Restore hydrogen recombiner to OPERABLE status.	30 days
B. **[** Two hydrogen recombiners inoperable.	B.1	Verify by administrative means that the hydrogen control function is maintained.	1 hour <u>AND</u> Once every 12 hours thereafter
	<u>AND</u>		
	B.2	Restore one hydrogen recombiner to OPERABLE status.	7 days **]**
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours

3.6 CONTAINMENT SYSTEMS

3.6.9 Hydrogen Mixing System (HMS) (Atmospheric and Dual)

LCO 3.6.9 [Two] HMS trains shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One HMS train inoperable.	A.1	~~- NOTE - LCO 3.0.4 is not applicable.~~ Restore HMS train to OPERABLE status.	30 days
B. [Two HMS trains inoperable.	B.1	Verify by administrative means that the hydrogen control function is maintained.	1 hour AND Once every 12 hours thereafter
	AND		
	B.2	Restore one HMS train to OPERABLE status.	7 days]
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours

3.7 PLANT SYSTEMS

3.7.4 Atmospheric Dump Valves (ADVs)

LCO 3.7.4 [Two] ADV lines shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3
[MODE 4 when steam generator is being relied upon for heat removal].

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One required ADV line inoperable.	A.1	~~- NOTE - LCO 3.0.4 is not applicable.~~ Restore ADV line to OPERABLE status.	7 days
B. Two or more [required] ADV lines inoperable.	B.1	Restore all but one ADV line to OPERABLE status.	24 hours
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	6 hours
	[AND		
	C.2	Be in MODE 4 without reliance upon steam generator for heat removal.	[24] hours]

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.4.1	Verify one complete cycle of each ADV.	[18] months

3.7 PLANT SYSTEMS

3.7.5 Auxiliary Feedwater (AFW) System

LCO 3.7.5 [Three] AFW trains shall be OPERABLE.

- NOTE -
Only one AFW train, which includes a motor driven pump, is required to be OPERABLE in MODE 4.

APPLICABILITY: MODES 1, 2, and 3,
[MODE 4 when steam generator is relied upon for heat removal].

CEOG Insert 3

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. [One steam supply to turbine driven AFW pump inoperable. OR - NOTE - Only applicable if MODE 2 has not been entered following refueling. One turbine driven AFW pump inoperable in MODE 3 following refueling.	A.1	Restore affected equipment to OPERABLE status.	7 days AND 10 days from discovery of failure to meet the LCO]
B. One AFW train inoperable [for reasons other than Condition A] in MODE 1, 2, or 3.	B.1	Restore AFW train to OPERABLE status.	72 hours AND [10 days from discovery of failure to meet the LCO]

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources - Operating

LCO 3.8.1 The following AC electrical sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System,

b. Two diesel generators (DGs) each capable of supplying one train of the onsite Class 1E AC Electrical Power Distribution System, and

[c. Automatic load sequencers for Train A and Train B. **]**

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

CEOG Insert 4

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One [required] offsite circuit inoperable.	A.1	Perform SR 3.8.1.1 for [required] OPERABLE offsite circuit.	1 hour <u>AND</u> Once per 8 hours thereafter
	<u>AND</u>		
	A.2	Declare required feature(s) with no offsite power available inoperable when its redundant required feature(s) is inoperable.	24 hours from discovery of no offsite power to one train concurrent with inoperability of redundant required feature(s)
	<u>AND</u>		

BASES

LCO 3.0.3 (continued)

The time limits of LCO 3.0.3 allow 37 hours for the unit to be in MODE 5 when a shutdown is required during MODE 1 operation. If the unit is in a lower MODE of operation when a shutdown is required, the time limit for reaching the next lower MODE applies. If a lower MODE is reached in less time than allowed, however, the total allowable time to reach MODE 5, or other applicable MODE, is not reduced. For example, if MODE 3 is reached in 2 hours, then the time allowed for reaching MODE 4 is the next 11 hours, because the total time for reaching MODE 4 is not reduced from the allowable limit of 13 hours. Therefore, if remedial measures are completed that would permit a return to MODE 1, a penalty is not incurred by having to reach a lower MODE of operation in less than the total time allowed.

In MODES 1, 2, 3, and 4, LCO 3.0.3 provides actions for Conditions not covered in other Specifications. The requirements of LCO 3.0.3 do not apply in MODES 5 and 6 because the unit is already in the most restrictive Condition required by LCO 3.0.3. The requirements of LCO 3.0.3 do not apply in other specified conditions of the Applicability (unless in MODE 1, 2, 3, or 4) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken.

Exceptions to LCO 3.0.3 are provided in instances where requiring a unit shutdown, in accordance with LCO 3.0.3, would not provide appropriate remedial measures for the associated condition of the unit. An example of this is in LCO 3.7.16, "Fuel Storage Pool Water Level." LCO 3.7.16 has an Applicability of "During movement of irradiated fuel assemblies in the fuel storage pool." Therefore, this LCO can be applicable in any or all MODES. If the LCO and the Required Actions of LCO 3.7.16 are not met while in MODE 1, 2, or 3, there is no safety benefit to be gained by placing the unit in a shutdown condition. The Required Action of LCO 3.7.16 of "Suspend movement of irradiated fuel assemblies in fuel storage pool" is the appropriate Required Action to complete in lieu of the actions of LCO 3.0.3. These exceptions are addressed in the individual Specifications.

[The requirement to be in MODE 4 in 13 hours is plant specific and depends on the ability to cool the pressurizer and degas.]

LCO 3.0.4

Insert 3

~~LCO 3.0.4 establishes limitations on changes in MODES or other specified conditions in the Applicability when an LCO is not met. It precludes placing the unit in a MODE or other specified condition stated in that Applicability (e.g., Applicability desired to be entered) when the following exist:~~

BASES

LCO 3.0.4 (continued)

a. Unit conditions are such that the requirements of the LCO would not be met in the Applicability desired to be entered and

b. Continued noncompliance with the LCO requirements, if the Applicability were entered, would result in the unit being required to exit the Applicability desired to be entered to comply with the Required Actions.

Compliance with Required Actions that permit continued operation of the unit for an unlimited period of time in a MODE or other specified condition provides an acceptable level of safety for continued operation. This is without regard to the status of the unit before or after the MODE change. Therefore, in such cases, entry into a MODE or other specified condition in the Applicability may be made in accordance with the provisions of the Required Actions. The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before entering an associated MODE or other specified condition in the Applicability.

The provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that result from any unit shutdown.

Exceptions to LCO 3.0.4 are stated in the individual Specifications. These exceptions allow entry into MODES or other specified conditions in the Applicability when the associated ACTIONS to be entered do not provide for continued operation for an unlimited period of time. Exceptions may apply to all the ACTIONS or to a specific Required Action of a Specification.

LCO 3.0.4 is only applicable when entering MODE 4 from MODE 5, MODE 3 from MODE 4, MODE 2 from MODE 3, or MODE 1 from MODE 2. Furthermore, LCO 3.0.4 is applicable when entering any other specified condition in the Applicability only while operating in MODES 1, 2, 3, or 4. The requirements of LCO 3.0.4 do not apply in MODES 5 and 6, or in other specified conditions of the Applicability (unless in MODES 1, 2, 3, or 4) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken. [In some cases (e.g., ...) these ACTIONS provide a Note that states "While this LCO is not met, entry into a MODE or other specified condition in the Applicability is not permitted, unless required to comply with ACTIONS." This Note is a

BASES

LCO 3.0.4 (continued)

~~requirement explicitly precluding entry into a MODE or other specified condition of the Applicability.]~~

~~Surveillances do not have to be performed on the associated inoperable equipment (or on variables outside the specified limits), as permitted by SR 3.0.1. Therefore, changing MODES or other specified conditions while in an ACTIONS Condition, in compliance with LCO 3.0.4 or where an exception to LCO 3.0.4 is stated, is not a violation of SR 3.0.1 or SR 3.0.4 for those Surveillances that do not have to be performed due to the associated inoperable equipment. However, SRs must be met to ensure OPERABILITY prior to declaring the associated equipment OPERABLE (or variable within limits) and restoring compliance with the affected LCO.~~

LCO 3.0.5

LCO 3.0.5 establishes the allowance for restoring equipment to service under administrative controls when it has been removed from service or declared inoperable to comply with ACTIONS. The sole purpose of this Specification is to provide an exception to LCO 3.0.2 (e.g., to not comply with the applicable Required Action(s)) to allow the performance of required testing to demonstrate either:

a. The OPERABILITY of the equipment being returned to service or

b. The OPERABILITY of other equipment.

The administrative controls ensure the time the equipment is returned to service in conflict with the requirements of the ACTIONS is limited to the time absolutely necessary to perform the required testing to demonstrate OPERABILITY. This Specification does not provide time to perform any other preventive or corrective maintenance.

An example of demonstrating the OPERABILITY of the equipment being returned to service is reopening a containment isolation valve that has been closed to comply with Required Actions and must be reopened to perform the required testing.

An example of demonstrating the OPERABILITY of other equipment is taking an inoperable channel or trip system out of the tripped condition to prevent the trip function from occurring during the performance of required testing on another channel in the other trip system. A similar example of demonstrating the OPERABILITY of other equipment is taking an inoperable channel or trip system out of the tripped condition to permit the logic to function and indicate the appropriate response during

BASES

SR 3.0.4

SR 3.0.4 establishes the requirement that all applicable SRs must be met before entry into a MODE or other specified Condition in the Applicability.

This Specification ensures that system and component OPERABILITY requirements and variable limits are met before entry into MODES or other specified conditions in the Applicability for which these systems and components ensure safe operation of the unit.

The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before entering an associated MODE or other specified condition in the Applicability.

However, in certain circumstances, failing to meet an SR will not result in SR 3.0.4 restricting a MODE change or other specified condition change. When a system, subsystem, division, component, device, or variable is inoperable or outside its specified limits, the associated SR(s) are not required to be performed, per SR 3.0.1, which states that surveillances do not have to be performed on inoperable equipment. When equipment is inoperable, SR 3.0.4 does not apply to the associated SR(s) since the requirement for the SR(s) to be performed is removed. Therefore, failing to perform the Surveillance(s) within the specified Frequency does not result in an SR 3.0.4 restriction to changing MODES or other specified conditions of the Applicability. However, since the LCO is not met in this instance, LCO 3.0.4 will govern any restrictions that may (or may not) apply to MODE or other specified condition changes.

Insert 4

The provisions of SR 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that result from any unit shutdown.

The precise requirements for performance of SRs are specified such that exceptions to SR 3.0.4 are not necessary. The specific time frames and conditions necessary for meeting the SRs are specified in the Frequency, in the Surveillance, or both. This allows performance of Surveillances when the prerequisite condition(s) specified in a Surveillance procedure require entry into the MODE or other specified condition in the Applicability of the associated LCO prior to the performance or completion of a Surveillance. A Surveillance that could not be performed until after entering the LCO Applicability, would have its Frequency specified such that it is not "due" until the specific conditions needed are met. Alternately, the Surveillance may be stated in the form of a Note as not required (to be met or performed) until a particular event, condition, or time has been reached. Further discussion of the specific formats of SRs' annotation is found in Section 1.4, Frequency.

BASES

SR 3.0.4 (continued)

~~SR 3.0.4 is only applicable when entering MODE 4 from MODE 5, MODE 3 from MODE 4, Mode 2 from MODE 3, or MODE 1 from MODE 2. Furthermore, SR 3.0.4 is applicable when entering any other specified condition in the Applicability only while operating in MODES 1, 2, 3, or 4. The requirements of SR 3.0.4 do not apply in MODES 5 and 6, or in other specified conditions of the Applicability (unless in MODES 1, 2, 3, or 4) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken.~~

REVISION HISTORY

REVISION	TSTF	DESCRIPTION	APPROVED
2.1	TSTF-358, R.6	Missed Surveillance Requirement	10/01/01

BASES

ACTIONS (continued)

entered independently for each Function. The Completion Times of each inoperable Function will be tracked separately for each Function, starting from the time the Condition was entered.

A.1, A.2.1, and A.2.2

Condition A applies to the failure of a single channel in any RPS automatic trip Function. RPS coincidence logic is normally two-out-of-four.

If one RPS bistable trip unit or associated instrument channel is inoperable, startup or power operation is allowed to continue, providing the inoperable trip unit is placed in bypass or trip within 1 hour (Required Action A.1). With one channel in bypass, no additional random failure of a single channel could spuriously trip the reactor and a valid trip signal can still trip the reactor. With one channel in trip, an additional random failure of a single channel could spuriously trip the reactor. Therefore, it is preferable to place an inoperable channel in bypass rather than trip.

The Completion Time of 1 hour allotted to restore, bypass, or trip the channel is sufficient to allow the operator to take all appropriate actions for the failed channel while ensuring that the risk involved in operating with the failed channel is acceptable.

The failed channel is restored to OPERABLE status or is placed in trip within [48] hours (Required Action A.2.1 or Required Action A.2.2). Required Action A.2.1 restores the full capability of the Function.

[Required Action A.2.2 places the Function in a one-out-of-three configuration. In this configuration, common cause failure of dependent channels cannot prevent trip.]

The Completion Time of [48] hours is based on operating experience, which has demonstrated that a random failure of a second channel occurring during the [48] hour period is a low probability event.

B.1 and B.2

Condition B applies to the failure of two channels in any RPS automatic trip Function.

~~The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES even~~

BASES

ACTIONS (continued)

though two channels are inoperable, with one channel bypassed and one tripped. MODE changes in this configuration are allowed to permit maintenance and testing on one of the inoperable channels. In this configuration, the protection system is in a one-out-of-two logic, and the probability of a common cause failure affecting both of the OPERABLE channels during the [48] hours permitted is remote.

Required Action B.1 provides for placing one inoperable channel in bypass and the other channel in trip within the Completion Time of 1 hour. This Completion Time is sufficient to allow the operator to take all appropriate actions for the failed channels while ensuring that the risk involved in operating with the failed channels is acceptable. With one channel of protective instrumentation bypassed, the RPS is in a two-out-of-three logic; but with another channel failed, the RPS may be operating in a two-out-of-two logic. This is outside the assumptions made in the analyses and should be corrected. To correct the problem, the second channel is placed in trip. This places the RPS in a one-out-of-two logic. If any of the other OPERABLE channels receives a trip signal, the reactor will trip.

One channel should be restored to OPERABLE status within [48] hours for reasons similar to those stated under Condition A. After one channel is restored to OPERABLE status, the provisions of Condition A still apply to the remaining inoperable channel. Therefore, the channel that is still inoperable after completion of Required Action B.2 must be placed in trip if more than [48] hours have elapsed since the initial channel failure.

C.1 and C.2

The excore detectors are used to generate the internal ASI used as an input to the TM/LP and APD - High trips. Incore detectors provide a more accurate measurement of ASI. If one or more excore detectors cannot be calibrated to match incore detectors, power is restricted or reduced during subsequent operations because of increased uncertainty associated with using uncalibrated excore detectors.

The Completion Time of 24 hours is adequate to perform the SR while minimizing the risk of operating in an unsafe condition.

D.1, D.2.1, D.2.2.1, and D.2.2.2

Condition D applies to one automatic bypass removal channel inoperable. If the bypass removal channel for any operating bypass cannot be

BASES

ACTIONS (continued)

restored to OPERABLE status, the associated RPS channel may be considered OPERABLE only if the bypass is not in effect. Otherwise, the affected RPS channel must be declared inoperable, as in Condition A, and the bypass either removed or the bypass removal channel repaired. The Bases for Required Actions and Completion Times are the same as discussed for Condition A.

E.1, E.2.1, and E.2.2

Condition E applies to two inoperable automatic bypass removal channels. If the bypass removal channels cannot be restored to OPERABLE status, the associated RPS channel may be considered OPERABLE only if the bypass is not in effect. Otherwise, the affected RPS channels must be declared inoperable, as in Condition B, and the bypass either removed or the bypass removal channel repaired. Also, Required Action E.2.2 provides for the restoration of the one affected automatic trip channel to OPERABLE status within the rules of Completion Time specified under Condition B. Completion Times are consistent with Condition B.

~~The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES even though two channels are inoperable, with one channel bypassed and one tripped. MODE changes in this configuration are allowed to permit maintenance and testing on one of the inoperable channels. In this configuration, the protection system is in a one-out-of-two logic, and the probability of a common cause failure affecting both of the OPERABLE channels during the [48] hours permitted is remote.~~

F.1

Condition F is entered when the Required Action and associated Completion Time of Conditions A, B, C, D, or E are not met for the Axial Power Distribution and Loss of Load Trip Functions.

If the Required Actions associated with these Conditions cannot be completed within the required Completion Times, the reactor must be brought to a MODE in which the Required Actions do not apply. The allowed Completion Time of 6 hours to reduce THERMAL POWER to < 15% RTP is reasonable, based on operating experience, to decrease power to < 15% RTP from full power conditions in an orderly manner and without challenging plant systems.

BASES

ACTIONS (continued)

two-out-of-three logic; but with another channel failed, the RPS may be operating in a two-out-of-two logic. This is outside the assumptions made in the analyses and should be corrected. To correct the problem, the second channel is placed in trip. This places the RPS in a one-out-of-two logic. If any of the other OPERABLE channels receives a trip signal, the reactor will trip.

[The bypassed channel should be restored to OPERABLE status within 48 hours for reasons similar to those stated under Condition A. After one channel is restored to OPERABLE status, the provisions of Condition A still apply to the remaining inoperable channel. Therefore, the channel that is still inoperable after completion of Required Action B.2 shall be placed in trip if more than 48 hours have elapsed since the initial channel failure.]

~~The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES even though two channels are inoperable, with one channel bypassed and one tripped. MODE changes in this configuration are allowed to permit maintenance and testing on one of the inoperable channels. In this configuration, the protection system is in a one-out-of-two logic, and the probability of a common cause failure affecting both of the OPERABLE channels during the [48] hours permitted is remote.~~

C.1, C.2.1, C.2.2.1, and C.2.2.2

Condition C applies to one automatic bypass removal channel inoperable. If the bypass removal channel cannot be restored to OPERABLE status, the associated Power Rate of Change - High RPS channel may be considered OPERABLE only if the bypass is not in effect. Otherwise, the affected RPS channel must be declared inoperable, as in Condition A, and the bypass either removed or the bypass removal channel repaired. The Bases for the Required Actions and Completion Times are the same as discussed for Condition A.

D.1, D.2.1, and D.2.2

Condition D applies to two inoperable automatic bypass removal channels. If the bypass removal channels cannot be restored to OPERABLE status, the associated Power Rate of Change - High RPS channel may be considered OPERABLE only if the bypass is not in effect. Otherwise, the affected RPS channels must be declared inoperable, as in Condition B, and the bypass either removed or the

BASES

ACTIONS (continued)

bypass removal channel repaired. Also, Required Action D.2.2 provides for the restoration of the one affected automatic trip channel to OPERABLE status within the rules of Completion Time specified under Condition B. Completion Times are consistent with Condition B.

~~The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES even though two channels are inoperable, with one channel bypassed and one tripped. MODE changes in this configuration are allowed to permit maintenance and testing on one of the inoperable channels. In this configuration, the protection system is in a one-out-of-two logic, and the probability of a common cause failure affecting both of the OPERABLE channels during the 48 hours permitted is remote.~~

E.1

Condition E is entered when the Required Actions and associated Completion Times of Condition A, B, C, or D are not met.

If Required Actions associated with these Conditions cannot be completed within the required Completion Time, opening the RTCBs brings the reactor to a MODE where the LCO does not apply and ensures no CEA withdrawal will occur. The basis for the Completion Time of 6 hours is that it is adequate to complete the Required Actions without challenging plant systems, including the insertion of CEAs for plants that normally maintain CEAs withdrawn when shut down.

SURVEILLANCE REQUIREMENTS

- REVIEWER'S NOTE -

In order for a plant to take credit for topical reports as the basis for justifying Frequencies, topical reports must be supported by an NRC staff Safety Evaluation Report that establishes the acceptability of each topical report for that plant.

SR 3.3.2.1

Performance of the CHANNEL CHECK on each wide range channel once every 12 hours ensures that gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on another channel. 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

BASES

ACTIONS (continued)

5. Recirculation Actuation Signal
   Refueling Water Tank Level - Low

6. Auxiliary Feedwater Actuation Signal
   Steam Generator Level - Low
   Steam Generator Pressure Difference - High

With two inoperable channels, one channel should be placed in bypass, and the other channel should be placed in trip within the 1 hour Completion Time. With one channel of protective instrumentation bypassed, the ESFAS Function is in two-out-of-three logic, but with another channel failed the ESFAS may be operating with a two-out-of-two logic. This is outside the assumptions made in the analyses and should be corrected. To correct the problem, the second channel is placed in trip. This places the ESFAS in a one-out-of-two logic. If any of the other OPERABLE channels receives a trip signal, ESFAS actuation will occur.

One of the failed channels should be restored to OPERABLE status within [48] hours, for reasons similar to those stated under Condition B. After one channel is restored to OPERABLE status, the provisions of Condition B still apply to the remaining inoperable channel. Therefore, the channel that is still inoperable after completion of Required Action C.2 must be placed in trip if more than [48] hours has elapsed since the initial channel failure.

~~The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES even though two channels are inoperable, with one channel bypassed and one tripped. MODE changes in this configuration are allowed, to permit maintenance and testing on one of the inoperable channels. In this configuration, the protection system is in a one-out-of-two logic, and the probability of a common cause failure affecting both of the OPERABLE channels during the [48] hours permitted is remote.~~

D.1, D.2.1, D.2.2.1, and D.2.2.2

Condition D applies to the failure of one bypass removal channel.

The bypass removal channels consist of four sensor subsystems and two actuation subsystems. Condition D applies to failures in one of the four sensor subsystems, including sensors, bistables, and associated equipment. Failures in the actuation subsystems, including the manual

BASES

ACTIONS (continued)

Required Action E.2.1 and Required Action E.2.2 are equivalent to the Required Actions for a two automatic trip channel failure (Condition C). Also similar to Condition C, after one set of inoperable channels is restored, the provisions of Condition D still apply to the remaining inoperable channel, with the Completion Time measured from the point of the initial bypass channel failure. The 1 hour and [48] hour Completion Times have the same bases as discussed for Condition C.

~~The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES even though two channels are inoperable, with one channel bypassed and one tripped. MODE changes in this configuration are allowed, to permit maintenance and testing on one of the inoperable channels. In this configuration, the protection system is in a one-out-of-two logic, and the probability of a common cause failure affecting both of the OPERABLE channels during the 48 hours permitted is remote.~~

F.1 and F.2

If the Required Actions and associated Completion Times of Condition A, B, C, D, or E are not met, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 4 within [12] hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

The SRs for any particular ESFAS Function are found in the SRs column of Table 3.3.4-1 for that Function. Most functions are subject to CHANNEL CHECK, CHANNEL FUNCTIONAL TEST, CHANNEL CALIBRATION, and response time testing.

- REVIEWER'S NOTE -

In order for a unit to take credit for topical reports as the basis for justifying Frequencies, topical reports should be supported by an NRC staff Safety Evaluation Report that establishes the acceptability of each topical report for that unit.

BASES

ACTIONS (continued)

Once Required Action A.1 has been complied with, Required Action A.2.1 allows [48] hours to repair the inoperable channel for those plants that have not demonstrated sufficient channel to channel independence on this Function. If the channel cannot be restored to OPERABLE status, it must be tripped in accordance with Required Action A.2.2. The time allowed to repair or trip the channel is reasonable to repair the affected channel while ensuring that the risk involved in operating with the inoperable channel is acceptable. The [48] hour Completion Time is based upon operating experience, which has demonstrated that a random failure of a second channel is a rare event during any given [48] hour period.

B.1, B.2.1, and B.2.2

Condition B applies if two channels are inoperable for one or more Functions per DG.

~~The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES, even though two channels are inoperable, with one channel bypassed and one tripped. In this configuration, the protection system is in a one-out-of-two logic, which is adequate to ensure that no random failure will prevent protection system operation.~~

Editorial change made for consistency with 3.3.7 (digital)

~~Restoring at least one channel to OPERABLE status is the preferred action.~~ If the channel cannot be restored to OPERABLE status within 1 hour, the Conditions and Required Actions for the associated DG made inoperable by DG - LOVS instrumentation are required to be entered. Alternatively, one affected channel is required to be bypassed and the other is tripped, in accordance with Required Action B.2.1. This places the Function in one-out-of-two logic. The 1 hour Completion Time is sufficient to perform the Required Actions.

Once Required Action B.2.1 has been complied with, Required Action B.2.2 allows [48] hours to repair the bypassed or inoperable channel.

After one channel is restored to OPERABLE status, the provisions of Condition A still apply to the remaining inoperable channel. Therefore, the channel that is still inoperable after completion of Required Action B.2.2 shall be placed in trip if more than [48] hours have elapsed since the initial channel failure.

BASES

ACTIONS (continued)

Once the Required Action to trip or bypass the channel has been complied with, Required Action C.2 provides for restoring one channel to OPERABLE status within 48 hours. The justification of the 48 hour Completion Time is the same as for Condition B.

After one channel is restored to OPERABLE status, the provisions of Condition C still apply to the remaining inoperable channel.

The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES even though two channels are inoperable, with one channel bypassed and one tripped. MODE changes in this configuration are allowed to permit maintenance and testing on one of the inoperable channels. In this configuration, the protection system is in a one-out-of-two logic, and the probability of a common cause failure affecting both of the OPERABLE channels during the 48 hours permitted is remote.

D.1 and D.2

Condition D specifies the shutdown track to be followed if two Actuation Logic channels are inoperable or if the Required Actions and associated Completion Times of Condition A, B, or C are not met. If two Actuation Logic channels are inoperable or the Required Actions cannot be met within the required Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The Completion Times are reasonable, based on operating experience, to reach the required MODE from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.3.9.1

Performance of the CHANNEL CHECK on each CVCS isolation pressure indicating channel once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally 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

BASES

ACTIONS

~~Note 1 has been added in the ACTIONS to exclude the MODE change restriction of LCO 3.0.4. This exception allows entry into the applicable MODE while relying on the ACTIONS, even though the ACTIONS may eventually require plant shutdown. This exception is acceptable due to the passive function of the instruments, the operator's ability to monitor an accident using alternate instruments and methods, and the low probability of an event requiring these instruments.~~

A → Note ~~2~~ has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed in Table 3.3.11-1. The Completion Time(s) of the inoperable channel(s) of a Function will be tracked separately for each Function, starting from the time the Condition was entered for that Function.

A.1

When one or more Functions have one required channel that is inoperable, the required inoperable channel must be restored to OPERABLE status within 30 days. The 30 day Completion Time is based on operating experience and takes into account the remaining OPERABLE channel (or in the case of a Function that has only one required channel, other non-Regulatory Guide 1.97 instrument channels to monitor the Function), the passive nature of the instrument (no critical automatic action is assumed to occur from these instruments), and the low probability of an event requiring PAM instrumentation during this interval.

B.1

This Required Action specifies initiation of actions in accordance with Specification 5.6.7, which requires a written report to be submitted to the Nuclear Regulatory Commission. This report discusses the results of the root cause evaluation of the inoperability and identifies proposed restorative Required Actions. This Required Action is appropriate in lieu of a shutdown requirement, given the likelihood of plant conditions that would require information provided by this instrumentation. Also, alternative Required Actions are identified before a loss of functional capability condition occurs.

C.1

When one or more Functions have two required channels inoperable (i.e., two channels inoperable in the same Function), one channel in the Function should be restored to OPERABLE status within 7 days. The

BASES

APPLICABILITY (continued)

instrument control Functions if control room instruments or control become unavailable.

ACTIONS

~~A Note has been included that excludes the MODE change restrictions of LCO 3.0.4. This exception allows entry into an applicable MODE while relying on the ACTIONS, even though the ACTIONS may eventually require a plant shutdown. This is acceptable due to the low probability of an event requiring this system. The Remote Shutdown System equipment can generally be repaired during operation without significant risk of spurious trip.~~

A Remote Shutdown System division is inoperable when each Function is not accomplished by at least one designated Remote Shutdown System channel that satisfies the OPERABILITY criteria for the channel's Function. These criteria are outlined in the LCO section of the Bases.

A Note ~~2~~ has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function. The Completion Time(s) of the inoperable channel(s)/train(s) of a Function will be tracked separately for each Function, starting from the time the Condition was entered for that Function.

A.1

Condition A addresses the situation where one or more channels of the Remote Shutdown System are inoperable. This includes the control and transfer switches for any required Function .

The Required Action is to restore the divisions to OPERABLE status within 30 days. The Completion Time is based on operating experience and the low probability of an event that would require evacuation of the control room.

B.1 and B.2

If the Required Action and associated Completion Time of Condition A are not met, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 4 within [12] hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required MODE from full power conditions in an orderly manner and without challenging plant systems.

BASES

ACTIONS (continued)

this Specification may be entered independently for each Function. The Completion Times of each inoperable Function will be tracked separately for each Function, starting from the time the Condition was entered for that Function.

A.1 and A.2

Condition A applies to the failure of a single trip channel or associated instrument channel inoperable in any RPS automatic trip Function. RPS coincidence logic is two-out-of-four.

If one RPS channel is inoperable, startup or power operation is allowed to continue, providing the inoperable channel is placed in bypass or trip in 1 hour (Required Action A.1). The 1 hour allotted to bypass or trip the channel is sufficient to allow the operator to take all appropriate actions for the failed channel and still ensures that the risk involved in operating with the failed channel is acceptable. The failed channel must be restored to OPERABLE status prior to entering MODE 2 following the next MODE 5 entry. With a channel in bypass, the coincidence logic is now in a two-out-of-three configuration.

The Completion Time of prior to entering MODE 2 following the next MODE 5 entry is based on adequate channel to channel independence, which allows a two-out-of-three channel operation since no single failure will cause or prevent a reactor trip.

B.1

Condition B applies to the failure of two channels in any RPS automatic trip Function.

~~The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES, even though two channels are inoperable, with one channel bypassed and one tripped. In this configuration, the protection system is in a one-out-of-two logic, which is adequate to ensure that no random failure will prevent protection system operation.~~

Required Action B.1 provides for placing one inoperable channel in bypass and the other channel in trip within the Completion Time of 1 hour. This Completion Time is sufficient to allow the operator to take all appropriate actions for the failed channels while ensuring the risk involved in operating with the failed channels is acceptable. With one

BASES

ACTIONS (continued)

~~The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES even though two channels are inoperable, with one channel bypassed and one tripped. In this configuration, the protection system is in a one-out-of-two logic, which is adequate to ensure that no random failure will prevent protection system operation.~~

E.1

Condition E applies if any CPC cabinet receives a high temperature alarm. There is one temperature sensor in each of the four CPC bays. Since CPC bays B and C also house CEAC calculators 1 and 2, respectively, a high temperature in either of these bays may also indicate a problem with the associated CEAC. CEAC OPERABILITY is addressed in LCO 3.3.3.

If a CPC cabinet high temperature alarm is received, it is possible for the CPC to be affected and not be completely reliable. Therefore, a CHANNEL FUNCTIONAL TEST must be performed within 12 hours. The Completion Time of 12 hours is adequate considering the low probability of undetected failure, the consequences of a single channel failure, and the time required to perform a CHANNEL FUNCTIONAL TEST.

F.1

Condition F applies if an OPERABLE CPC has three or more autorestarts in a 12 hour period.

CPCs and CEACs will attempt to autorestart if they detect a fault condition, such as a calculator malfunction or loss of power. A successful autorestart restores the calculator to operation; however, excessive autorestarts might be indicative of a calculator problem.

If a nonbypassed CPC has three or more autorestarts, it may not be completely reliable. Therefore, a CHANNEL FUNCTIONAL TEST must be performed on the CPC to ensure it is functioning properly. Based on plant operating experience, the Completion Time of 24 hours is adequate and reasonable to perform the test while still keeping the risk of operating in this condition at an acceptable level, since overt channel failure will most likely be indicated and annunciated in the control room by CPC online diagnostics.

BASES

ACTIONS (continued)

B.1

Condition B applies to the failure of two Logarithmic Power Level - High trip channels or associated instrument channels. Required Action B.1 provides for placing one inoperable channel in bypass and the other channel in trip within the Completion Time of 1 hour. This Completion Time is sufficient to allow the operator to take all appropriate actions for the failed channels and still ensures the risk involved in operating with the failed channels is acceptable. With one channel of protective instrumentation bypassed, the RPS is in a two-out-of-three logic; but with another channel failed, the RPS may be operating in a two-out-of-two logic. This is outside the assumptions made in the analyses and should be corrected. To correct the problem, the second channel is placed in trip. This places the RPS in a one-out-of-two logic. If any of the other OPERABLE channels receives a trip signal, the reactor will trip.

One of the two inoperable channels will need to be restored to OPERABLE status prior to the next required CHANNEL FUNCTIONAL TEST because channel surveillance testing on an OPERABLE channel requires that the OPERABLE channel be placed in bypass. However, it is not possible to bypass more than one RPS channel, and placing a second channel in trip will result in a reactor trip. Therefore, if one RPS channel is in trip and a second channel is in bypass, a third inoperable channel would place the unit in LCO 3.0.3.

~~The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES even though two channels are inoperable, with one channel bypassed and one tripped. In this configuration, the protection system is in a one-out-of-two logic, which is adequate to ensure that no random failure will prevent protection system operation.~~

C.1, C.2.1, and C.2.2

Condition C applies to one automatic bypass removal channel inoperable. If the bypass removal channel for the high logarithmic power level operating bypass cannot be restored to OPERABLE status within 1 hour, the associated RPS channel may be considered OPERABLE only if the bypass is not in effect. Otherwise, the affected RPS channel must be declared inoperable, as in Condition A, and the bypass either removed or the affected automatic channel placed in trip or bypass. Both the bypass removal channel and the associated automatic trip channel must be repaired prior to entering MODE 2 following the next MODE 5 entry. The

BASES

ACTIONS (continued)

Bases for the Required Actions and required Completion Times are consistent with Condition A.

D.1 and D.2

Condition D applies to two inoperable automatic bypass removal channels. If the bypass removal channels for two operating bypasses cannot be restored to OPERABLE status within 1 hour, the associated RPS channel may be considered OPERABLE only if the bypass is not in effect. Otherwise, the affected RPS channels must be declared inoperable, as in Condition B, and the bypass either removed or one automatic trip channel placed in bypass and the other in trip within 1 hour. The restoration of one affected bypassed automatic trip channel must be completed prior to the next CHANNEL FUNCTIONAL TEST or the plant must shut down per LCO 3.0.3, as explained in Condition B. Completion Times are consistent with Condition B.

~~The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES even though two channels are inoperable, with one channel bypassed and one tripped. In this configuration, the protection system is in a one-out-of-two logic, which is adequate to ensure that no random failure will prevent protection system operation.~~

E.1

Condition E is entered when the Required Actions and associated Completion Times of Condition A, B, C, or D are not met.

If Required Actions associated with these Conditions cannot be completed within the required Completion Time, all RTCBs must be opened, placing the plant in a condition where the logarithmic power trip channels are not required to be OPERABLE. A Completion Time of 1 hour is a reasonable time to perform the Required Action, which maintains the risk at an acceptable level while having one or two channels inoperable.

SURVEILLANCE REQUIREMENTS

The SRs for the Logarithmic Power Level - High trip are an extension of those listed in LCO 3.3.1, listed here because of their Applicability in these MODES.

BASES

ACTIONS (continued)

5. Recirculation Actuation Signal Refueling Water Storage Tank Level - Low

6. Emergency Feedwater Actuation Signal SG #1 (EFAS-1) Steam Generator Level - Low SG Pressure Difference - High Steam Generator Pressure - Low

7. Emergency Feedwater Actuation Signal SG #2 (EFAS-2) Steam Generator Level - Low SG Pressure Difference - High Steam Generator Pressure - Low

ESFAS coincidence logic is normally two-out-of-four.

If one ESFAS channel is inoperable, startup or power operation is allowed to continue, providing the inoperable channel is placed in bypass or trip within 1 hour (Required Action A.1).

The Completion Time of 1 hour allotted to restore, bypass, or trip the channel is sufficient to allow the operator to take all appropriate actions for the failed channel and still ensures that the risk involved in operating with the failed channel is acceptable.

The failed channel must be restored to OPERABLE status prior to entering MODE 2 following the next MODE 5 entry. With a channel bypassed, the coincidence logic is now in a two-out-of-three configuration. In this configuration, common cause failure of dependent channels cannot prevent trip. The Completion Time of prior to entering MODE 2 following the next MODE 5 entry is based on adequate channel to channel independence, which allows a two-out-of-three channel operation, since no single failure will cause or prevent a reactor trip.

B.1

~~The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES even though two channels are inoperable, with one channel bypassed and one tripped. In this configuration, the protection system is in a one-out-of-two logic, which is adequate to ensure that no random failure will prevent protection system operation.~~

Condition B applies to the failure of two channels of one or more input parameters in the following ESFAS automatic trip Functions:

BASES

ACTIONS (continued)

C.1, C.2.1, and C.2.2

Condition C applies to one automatic bypass removal channel inoperable. The only automatic bypass removal on an ESFAS is on the Pressurizer Pressure - Low signal. This bypass removal is shared with the RPS Pressurizer Pressure - Low bypass removal.

If the bypass removal channel for any operating bypass cannot be restored to OPERABLE status, the associated ESFAS channel may be considered OPERABLE only if the bypass is not in effect. Otherwise, the affected ESFAS channel must be declared inoperable, as in Condition A, and the bypass either removed or the bypass removal channel repaired. The Bases for the Required Actions and required Completion Times are consistent with Condition A.

D.1 and D.2

~~The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES even though two channels are inoperable, with one channel bypassed and one tripped. In this configuration, the protection system is in a one-out-of-two logic, which is adequate to ensure that no random failure will prevent protection system operation.~~

Condition D applies to two inoperable automatic bypass removal channels. If the bypass removal channels for two operating bypasses cannot be restored to OPERABLE status, the associated ESFAS channel may be considered OPERABLE only if the bypass is not in effect. Otherwise, the affected ESFAS channels must be declared inoperable, as in Condition B, and either the bypass removed or the bypass removal channel repaired. The restoration of one affected bypassed automatic trip channel must be completed prior to the next CHANNEL FUNCTIONAL TEST or the plant must shut down per LCO 3.0.3, as explained in Condition B. Completion Times are consistent with Condition B.

E.1 and E.2

If the Required Actions and associated Completion Times of Condition A, B, C, or D cannot be met, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 4 within [12] hours. The allowed Completion Times are reasonable, based on

BASES

ACTIONS (continued)

Once Required Action A.1 has been complied with, Required Action A.2 allows prior to entering MODE 2 following the next MODE 5 entry to repair the inoperable channel. If the channel cannot be restored to OPERABLE status, the plant cannot enter MODE 2 following the next MODE 5 entry. The time allowed to repair or trip the channel is reasonable to repair the affected channel while ensuring that the risk involved in operating with the inoperable channel is acceptable. The prior to entering MODE 2 following the next MODE 5 entry Completion Time is based on adequate channel independence, which allows a two-out-of-three channel operation since no single failure will cause or prevent a reactor trip.

B.1 and B.2

Condition B applies if two channels are inoperable for one or more Functions.

~~The Required Action is modified by a Note stating that LCO 3.0.4 is not applicable. The Note was added to allow the changing of MODES even though two channels are inoperable, with one channel bypassed and one tripped. In this configuration, the protection system is in a one-out-of-two logic, which is adequate to ensure that no random failure will prevent protection system operation.~~

If the channel cannot be placed in bypass or trip within 1 hour, the Conditions and Required Actions for the associated DG made inoperable by DG - LOVS instrumentation are required to be entered. Alternatively, one affected channel is required to be bypassed and the other is tripped, in accordance with Required Action B.2. This places the Function in one-out-of-two logic. The 1 hour Completion Time is sufficient to perform the Required Actions.

One of the two inoperable channels will need to be restored to OPERABLE status prior to the next required CHANNEL FUNCTIONAL TEST because channel surveillance testing on an OPERABLE channel requires that the OPERABLE channel be placed in bypass. However, it is not possible to bypass more than one DG - LOVS channel, and placing a second channel in trip will result in a loss of voltage diesel start signal. Therefore, if one DG - LOVS channel is in trip and a second channel is in bypass, a third inoperable channel would place the unit in LCO 3.0.3.

After one channel is restored to OPERABLE status, the provisions of Condition A still apply to the remaining inoperable channel.

BASES

LCO (continued)

near the core perimeter, such that the pair of core exit thermocouples indicate the radial temperature gradient across their core quadrant. Plant specific evaluations in response to Item II.F.2 of NUREG-0737 (Ref. 3) should have identified the thermocouple pairings that satisfy these requirements. Two sets of two thermocouples in each quadrant ensure a single failure will not disable the ability to determine the radial temperature gradient.

For loop and steam generator related variables, the required information is individual loop temperature and individual steam generator level. In these cases two channels are required to be OPERABLE for each loop of steam generator to redundantly provide the necessary information.

In the case of Containment Isolation Valve Position, the important information is the status of the containment penetrations. The LCO requires one position indicator for each active containment isolation valve. This is sufficient to redundantly verify the isolation status of each isolable penetration either via indicated status of the active valve and prior knowledge of the passive valve or via system boundary status. If a normally active containment isolation valve is known to be closed and deactivated, position indication is not needed to determine status. Therefore, the position indication for valves in this state is not required to be OPERABLE.

APPLICABILITY

The PAM instrumentation LCO is applicable in MODES 1, 2, and 3. These variables are related to the diagnosis and preplanned actions required to mitigate DBAs. The applicable DBAs are assumed to occur in MODES 1, 2, and 3. In MODES 4, 5, and 6, plant conditions are such that the likelihood of an event occurring that would require PAM instrumentation is low; therefore, PAM instrumentation is not required to be OPERABLE in these MODES.

ACTIONS

~~Note 1 has been added in the ACTIONS to exclude the MODE change restriction of LCO 3.0.4. This exception allows entry into the applicable MODE while relying on the ACTIONS, even though the ACTIONS may eventually require plant shutdown. This exception is acceptable due to the passive function of the instruments, the operator's ability to monitor an accident using alternate instruments and methods, and the low probability of an event requiring these instruments.~~

A Note ~~2~~ 1 has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be

BASES

APPLICABILITY (continued)

instrument control Functions if control room instruments or control become unavailable.

ACTIONS

~~A Note has been included that excludes the MODE change restrictions of LCO 3.0.4. This exception allows entry into an applicable MODE while relying on the ACTIONS, even though the ACTIONS may eventually require a plant shutdown. This is acceptable due to the low probability of an event requiring this system.~~

A Remote Shutdown System division is inoperable when each Function is not accomplished by at least one designated Remote Shutdown System channel that satisfies the OPERABILITY criteria for the channel's Function. These criteria are outlined in the LCO section of the Bases.

A Note ~~2~~ 1 has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function. The Completion Time(s) of the inoperable channel(s)/train(s) of a Function will be tracked separately for each Function starting from the time the Condition was entered for that Function.

A.1

Condition A addresses the situation where one or more channels of the Remote Shutdown System are inoperable. This includes the control and transfer switches for any required Function.

The Required Action is to restore the divisions to OPERABLE status within 30 days. The Completion Time is based on operating experience and the low probability of an event that would require evacuation of the control room.

B.1 and B.2

If the Required Action and associated Completion Time of Condition A are not met, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 4 within [12] hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required MODE from full power conditions in an orderly manner and without challenging plant systems.

BASES

LCO

The LCO requires the PORV and its associated block valve to be OPERABLE. The block valve is required to be OPERABLE so it may be used to isolate the flow path if the PORV is not OPERABLE.

Valve OPERABILITY also means the PORV setpoint is correct. By ensuring that the PORV opening setpoint is correct, the PORV is not subject to frequent challenges from possible pressure increase transients, and therefore the possibility of a small break LOCA through a failed open PORV is not a frequent event.

APPLICABILITY

In MODES 1, 2, and 3, the PORV and its block valve are required to be OPERABLE to limit the potential for a small break LOCA through the flow path. A likely cause for PORV small break LOCA is a result of pressure increase transients that cause the PORV to open. Imbalances in the energy output of the core and heat removal by the secondary system can cause the RCS pressure to increase to the PORV opening setpoint. Pressure increase transients can occur any time the steam generators are used for heat removal. The most rapid increases will occur at higher operating power and pressure conditions of MODES 1 and 2.

Pressure increases are less prominent in MODE 3 because the core input energy is reduced, but the RCS pressure is high. Therefore, this LCO is applicable in MODES 1, 2, and 3. The LCO is not applicable in MODE 4 when both pressure and core energy are decreased and the pressure surges become much less significant. The PORV setpoint is reduced for LTOP in MODES 4, 5, and 6 with the reactor vessel head in place. LCO 3.4.12 addresses the PORV requirements in these MODES.

ACTIONS

The ACTIONS are modified by ~~two~~ a Note~~s~~. ~~Note 1~~ The clarifies that all pressurizer PORVs and block valves are treated as separate entities, each with separate Completion Times (i.e., the Completion Time is on a component basis). ~~Note 2 is an exception to LCO 3.0.4. The exception for LCO 3.0.4 permits entry into MODES 1, 2, and 3 to perform cycling of the PORV or block valve to verify their OPERABLE status, in the event that testing was not satisfactorily performed in lower MODES. Testing is typically not performed in lower MODES.~~

A.1

With the PORV inoperable and capable of being manually cycled, either the PORV must be restored or the flow path isolated within 1 hour. The block valve should be closed but power must be maintained to the associated block valve, since removal of power would render the block valve inoperable. Although the PORV may be designated inoperable, it

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BASES

APPLICABILITY (continued)

consequences of an SGTR to within the acceptable site boundary dose values.

For operation in MODE 3 with RCS average temperature < 500°F, and in MODES 4 and 5, the release of radioactivity in the event of an SGTR is unlikely since the saturation pressure of the reactor coolant is below the lift pressure settings of the atmospheric dump valves and main steam safety valves.

ACTIONS

A.1 and A.2

With the DOSE EQUIVALENT I-131 greater than the LCO limit, samples at intervals of 4 hours must be taken to demonstrate the limits of Figure 3.4.16-1 are not exceeded. The Completion Time of 4 hours is required to obtain and analyze a sample.

Sampling must continue for trending. The DOSE EQUIVALENT I-131 must be restored to within limits within 48 hours.

The Completion Time of 48 hours is required if the limit violation resulted from normal iodine spiking.

Insert 8

~~A Note to the Required Action of Condition A excludes the MODE change restriction of LCO 3.0.4. This exception allows entry into the applicable MODE(S) while relying on the ACTIONS even though the ACTIONS may eventually require plant shutdown.~~ This exception allowance is acceptable due to the significant conservatism incorporated into the specific activity limit, the low probability of an event which is limiting due to exceeding this limit, and the ability to restore transient specific activity excursions while the plant remains at, or proceeds to power operation.

B.1

If a Required Action and associated Completion Time of Condition A is not met or if the DOSE EQUIVALENT I-131 is in the unacceptable region of Figure 3.4.16-1, the reactor must be brought to MODE 3 with RCS average temperature < 500°F within 6 hours. The allowed Completion Time of 6 hours is required to reach MODE 3 below 500°F without challenging plant systems.

C.1

With the gross specific activity in excess of the allowed limit, the unit must be placed in a MODE in which the requirement does not apply.

BASES

APPLICABILITY (continued)

the pressurizer safety valves that provide overpressure protection during MODES 1, 2, and 3, and MODE 4 above [285]°F.

Low temperature overpressure prevention is most critical during shutdown when the RCS is water solid, and a mass or heat input transient can cause a very rapid increase in RCS pressure when little or no time allows operator action to mitigate the event.

ACTIONS

CEOG Insert 1B

A.1 and B.1

With two or more HPSI pumps capable of injecting into the RCS, overpressurization is possible.

The immediate Completion Time to initiate actions to restore restricted coolant input capability to the RCS reflects the importance of maintaining overpressure protection of the RCS.

C.1, D.1, and D.2

An unisolated SIT requires isolation within 1 hour. This is only required when the SIT pressure is greater than or equal to the maximum RCS pressure for the existing cold leg temperature allowed in the PTLR.

If isolation is needed and cannot be accomplished within 1 hour, Required Action D.1 and Required Action D.2 provide two options, either of which must be performed within 12 hours. By increasing the RCS temperature to > [175]°F, a SIT pressure of [600] psig cannot exceed the LTOP limits if the tanks are fully injected. Depressurizing the SIT below the LTOP limit stated in the PTLR also protects against such an event.

The Completion Times are based on operating experience that these activities can be accomplished in these time periods and on engineering evaluations indicating that an event requiring LTOP is not likely in the allowed times.

E.1

In MODE 4 when any RCS cold leg temperature is ≤ [285]°F, with one PORV inoperable, two PORVs must be restored to OPERABLE status within a Completion Time of 7 days. Two valves are required to meet the LCO requirement and to provide low temperature overpressure mitigation while withstanding a single failure of an active component.

BASES

LCO (continued)

leaks are detected in time to allow actions to place the plant in a safe condition when RCS LEAKAGE indicates possible RCPB degradation.

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the containment sump monitor, in combination with a particulate or gaseous radioactivity monitor [and a containment air cooler condensate flow rate monitor], provides an acceptable minimum.

APPLICABILITY

Because of elevated RCS temperature and pressure in MODES 1, 2, 3, and 4, RCS leakage detection instrumentation is required to be OPERABLE.

In MODE 5 or 6, the temperature is ≤ 200°F and pressure is maintained low or at atmospheric pressure. Since the temperatures and pressures are far lower than those for MODES 1, 2, 3, and 4, the likelihood of leakage and crack propagation is much smaller. Therefore, the requirements of this LCO are not applicable in MODES 5 and 6.

ACTIONS

~~The Actions are modified by a Note that indicates the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when the containment sump and required radiation monitor channels are inoperable. This allowance is provided because other instrumentation is available to monitor RCS LEAKAGE.~~

A.1 and A.2

If the containment sump monitor is inoperable, no other form of sampling can provide the equivalent information.

However, the containment atmosphere radioactivity monitor will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS water inventory balance, SR 3.4.13.1, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. A Note is added allowing that SR 3.4.13.1 is not required to be performed until 12 hours after establishing steady state operation (stable temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and [RCP seal injection and return flows]). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

BASES

LCO (continued)

With RCS pressure < 1700 psia, one HPSI pump is acceptable without single failure consideration, based on the stable reactivity condition of the reactor and the limited core cooling requirements. The low pressure safety injection (LPSI) pumps may therefore be released from the ECCS train for use in shutdown cooling (SDC). In MODE 4 with RCS cold leg temperature $\leq$ 285°F, a maximum of one HPSI pump is allowed to be OPERABLE in accordance with LCO 3.4.12, "Low Temperature Overpressure Protection (LTOP) System."

APPLICABILITY

In MODES 1, 2, and 3 with RCS pressure $\geq$ 1700 psia, the OPERABILITY requirements for ECCS are covered by LCO 3.5.2.

In MODE 3 with RCS pressure < 1700 psia and in MODE 4, one OPERABLE ECCS train is acceptable without single failure consideration, based on the stable reactivity condition of the reactor and the limited core cooling requirements.

In MODES 5 and 6, unit conditions are such that the probability of an event requiring ECCS injection is extremely low. Core cooling requirements in MODE 5 are addressed by LCO 3.4.7, "RCS Loops - MODE 5, Loops Filled," and LCO 3.4.8, "RCS Loops - MODE 5, Loops Not Filled." MODE 6 core cooling requirements are addressed by LCO 3.9.4, "Shutdown Cooling (SDC) and Coolant Circulation - High Water Level," and LCO 3.9.5, "Shutdown Cooling (SDC) and Coolant Circulation - Low Water Level."

ACTIONS

CEOG Insert 2B

A.1

With no HPSI pump OPERABLE, the unit is not prepared to respond to a loss of coolant accident. The 1 hour Completion Time to restore at least one HPSI train to OPERABLE status ensures that prompt action is taken to restore the required cooling capacity or to initiate actions to place the unit in MODE 5, where an ECCS train is not required.

B.1

When the Required Action cannot be completed within the required Completion Time, a controlled shutdown should be initiated. Twenty-four hours is reasonable, based on operating experience, to reach MODE 5 in an orderly manner and without challenging plant systems.

BASES

ACTIONS

A.1

With one containment hydrogen recombiner inoperable, the inoperable recombiner must be restored to OPERABLE status within 30 days. In this condition, the remaining OPERABLE hydrogen recombiner is adequate to perform the hydrogen control function. The 30 day Completion Time is based on the availability of the other hydrogen recombiner, the small probability of a LOCA or MSLB occurring (that would generate an amount of hydrogen that exceeds the flammability limit), and the amount of time available after a LOCA or MSLB (should one occur) for operator action to prevent hydrogen accumulation from exceeding the flammability limit.

~~Required Action A.1 has been modified by a Note stating that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when one hydrogen recombiner is inoperable. This allowance is based on the availability of the other hydrogen recombiner, the small probability of a LOCA or MSLB occurring (that would generate an amount of hydrogen that exceeds the flammability limit), and the amount of time available after a LOCA or MSLB (should one occur) for operator action to prevent hydrogen accumulation from exceeding the flammability limit.~~

B.1 and B.2

- REVIEWER'S NOTE -
This Condition is only allowed for units with an alternate hydrogen control system acceptable to the technical staff.

With two hydrogen recombiners inoperable, the ability to perform the hydrogen control function via alternate capabilities must be verified by administrative means within 1 hour. The alternate hydrogen control capabilities are provided by [the containment Hydrogen Purge System/hydrogen recombiner/Hydrogen Ignitor System/Hydrogen Mixing System/Containment Air Dilution System/Containment Inerting System]. The 1 hour Completion Time allows a reasonable period of time to verify that a loss of hydrogen control function does not exist.

- REVIEWER'S NOTE -
The following is to be used if a non-Technical Specification alternate hydrogen control function is used to justify this Condition: In addition, the alternate hydrogen control system capability must be verified every 12 hours thereafter to ensure its continued availability.

BASES

ACTIONS

A.1

With one HMS train inoperable, the inoperable train must be restored to OPERABLE status within 30 days. The 30 day Completion Time is based on the availability of the other HMS train, the small probability of a LOCA or SLB occurring (that would generate an amount of hydrogen that exceeds the flammability limit), the amount of time available after a LOCA or SLB (should one occur) for operator action to prevent hydrogen accumulation from exceeding the flammability limit, and the availability of the hydrogen recombiners, Containment Spray System, Hydrogen Purge System, and hydrogen monitors.

~~Required Action A.1 has been modified by a Note that states the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when one HMS train is inoperable. This allowance is based on the availability of the other HMS train, the small probability of a LOCA or SLB occurring (that would generate an amount of hydrogen that exceeds the flammability limit), and the amount of time available after a LOCA or SLB (should one occur) for operator action to prevent hydrogen accumulation from exceeding the flammability limit.~~

B.1 and B.2

- REVIEWER'S NOTE -

This Condition is only allowed for units with an alternate hydrogen control system acceptable to the technical staff.

With two HMS inoperable, the ability to perform the hydrogen control function via alternate capabilities must be verified by administrative means within 1 hour. The alternate hydrogen control capabilities are provided by [the containment Hydrogen Purge System/hydrogen recombiner/Hydrogen Ignitor System/HMS/Containment Air Dilution System/Containment Inerting System]. The 1 hour Completion Time allows a reasonable period of time to verify that a loss of hydrogen control function does not exist.

- REVIEWER'S NOTE -

The following is to be used if a non-Technical Specification alternate hydrogen control function is used to justify this Condition. In addition, the alternate hydrogen control system capability must be verified every 12 hours thereafter to ensure its continued availability.

BASES

APPLICABILITY

In MODES 1, 2, and 3, [and in MODE 4, when steam generator is being relied upon for heat removal,] the ADVs are required to be OPERABLE.

In MODES 5 and 6, an SGTR is not a credible event.

ACTIONS

A.1

~~Required Action A.1 is modified by a Note indicating that LCO 3.0.4 does not apply.~~

With one required ADV line inoperable, action must be taken to restore the OPERABLE status within 7 days. The 7 day Completion Time takes into account the redundant capability afforded by the remaining OPERABLE ADV lines, and a nonsafety grade backup in the Steam Bypass System and MSSVs.

B.1

With [two] or more [required] ADV lines inoperable, action must be taken to restore [one] of the ADV lines to OPERABLE status. As the block valve can be closed to isolate an ADV, some repairs may be possible with the unit at power. The 24 hour Completion Time is reasonable to repair inoperable ADV lines, based on the availability of the Steam Bypass System and MSSVs, and the low probability of an event occurring during this period that requires the ADV lines.

C.1 [and C.2]

If the ADV lines cannot be restored to OPERABLE status within the associated Completion Time, the unit must be placed in a MODE in which the LCO does not apply. To achieve this status, the unit must be placed in at least MODE 3 within 6 hours[, and in MODE 4, without reliance upon the steam generator for heat removal, within [24] hours]. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

SURVEILLANCE REQUIREMENTS

SR 3.7.4.1

To perform a controlled cooldown of the RCS, the ADVs must be able to be opened and throttled through their full range. This SR ensures the ADVs are tested through a full control cycle at least once per fuel cycle. Performance of inservice testing or use of an ADV during a unit cooldown may satisfy this requirement. Operating experience has shown that these

BASES

APPLICABILITY (continued)

generator secondary inventory, lost as the unit cools to MODE 4 conditions.

In MODE 4, the AFW System may be used for heat removal via the steam generator.

In MODES 5 and 6, the steam generators are not normally used for decay heat removal, and the AFW System is not required.

ACTIONS

CEOG Insert 3B

[A.1

If one of the two steam supplies to the turbine driven AFW pumps is inoperable, or if a turbine driven pump is inoperable while in MODE 3 immediately following refueling, action must be taken to restore the inoperable equipment to an OPERABLE status within 7 days. The 7 day Completion Time is reasonable based on the following reasons:

a. For the inoperability of a steam supply to the turbine driven AFW pump, the 7 day Completion time is reasonable since there is a redundant steam supply line for the turbine driven pump.

b. For the inoperability of a turbine driven AFW pump while in MODE 3 immediately subsequent to a refueling outage, the 7 day Completion time is reasonable due to the minimal decay heat levels in this situation.

c. For both the inoperabilty of a steam supply line to the turbine driven pump and an inoperable turbine driven AFW pump while in MODE 3 immediately following a refueling outage, the 7 day Completion time is reasonable due to the availability of redundant OPERABLE motor driven AFW pumps; and due to the low probability of an event requiring the use of the turbine driven AFW pump.

The second Completion Time for Required Action A.1 establishes a limit on the maximum time allowed for any combination of Conditions to be inoperable during any continuous failure to meet this LCO.

The 10 day Completion Time provides a limitation time allowed in this specified Condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The AND connector between 7 days and 10 days dictates that both Completion Times apply simultaneously and the more restrictive must be met.

BASES

LCO (continued)

The AC sources in one train must be separate and independent (to the extent possible) of the AC sources in the other train. For the DGs, separation and independence are complete.

For the offsite AC sources, separation and independence are to the extent practical. A circuit may be connected to more than one ESF bus, with fast transfer capability to the other circuit OPERABLE, and not violate separation criteria. A circuit that is not connected to an ESF bus is required to have OPERABLE fast transfer interlock mechanisms to at least two ESF buses to support OPERABILITY of that circuit.

APPLICABILITY

The AC sources [and sequencers] are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The AC power requirements for MODES 5 and 6 are covered in LCO 3.8.2, "AC Sources - Shutdown."

ACTIONS

CEOG Insert 4B

A.1

To ensure a highly reliable power source remains with the one offsite circuit inoperable, it is necessary to verify the OPERABILITY of the remaining required offsite circuit on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action not met. However, if a second required circuit fails SR 3.8.1.1, the second offsite circuit is inoperable, and Condition C, for two offsite circuits inoperable, is entered.

- REVIEWER'S NOTE -

The turbine driven auxiliary feedwater pump is only required to be considered a redundant required feature, and, therefore, required to be determined OPERABLE by this Required Action, if the design is such that the remaining OPERABLE motor or turbine driven auxiliary feedwater

3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY

LCO 3.0.1 LCOs shall be met during the MODES or other specified conditions in the Applicability, except as provided in LCO 3.0.2 and LCO 3.0.7.

LCO 3.0.2 Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met, except as provided in LCO 3.0.5 and LCO 3.0.6.

If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required unless otherwise stated.

LCO 3.0.3 When an LCO is not met and the associated ACTIONS are not met, an associated ACTION is not provided, or if directed by the associated ACTIONS, the unit shall be placed in a MODE or other specified condition in which the LCO is not applicable. Action shall be initiated within 1 hour to place the unit, as applicable, in:

a. MODE 2 within [7] hours,

b. MODE 3 within 13 hours, and

c. MODE 4 within 37 hours.

Exceptions to this Specification are stated in the individual Specifications.

Where corrective measures are completed that permit operation in accordance with the LCO or ACTIONS, completion of the actions required by LCO 3.0.3 is not required.

LCO 3.0.3 is only applicable in MODES 1, 2, and 3.

- REVIEWER'S NOTE -

The brackets around the time provided to reach MODE 2 allow a plant to extend the time from 7 hours to a plant specific time. Before the time can be changed, plant specific data must be provided to support the extended time.

LCO 3.0.4

Insert 1

~~When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time. This Specification shall not prevent changes in MODES or other specified~~

LCO 3.0.4 (continued)

conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.

Exceptions to this Specification are stated in the individual Specifications.

LCO 3.0.4 is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, and 3.

- REVIEWER'S NOTE -

LCO 3.0.4 has been revised so that changes in MODES or other specified conditions in the Applicability that are part of a shutdown of the unit shall not be prevented. In addition, LCO 3.0.4 has been revised so that it is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, and 3. The MODE change restrictions in LCO 3.0.4 were previously applicable in all MODES. Before this version of LCO 3.0.4 can be implemented on a plant-specific basis, the licensee must review the existing technical specifications to determine where specific restrictions on MODE changes or Required Actions should be included in individual LCOs to justify this change; such an evaluation should be summarized in a matrix of all existing LCOs to facilitate NRC staff review of a conversion to the STS.

LCO 3.0.5 Equipment removed from service or declared inoperable to comply with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment. This is an exception to LCO 3.0.2 for the system returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.

LCO 3.0.6 When a supported system LCO is not met solely due to a support system LCO not being met, the Conditions and Required Actions associated with this supported system are not required to be entered. Only the support system LCO ACTIONS are required to be entered. This is an exception to LCO 3.0.2 for the supported system. In this event, an evaluation shall be performed in accordance with Specification 5.5.12, "Safety Function Determination Program (SFDP)." If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

SR 3.0.1	SRs shall be met during the MODES or other specified conditions in the Applicability for individual LCOs, unless otherwise stated in the SR. Failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO. Failure to perform a Surveillance within the specified Frequency shall be failure to meet the LCO except as provided in SR 3.0.3. Surveillances do not have to be performed on inoperable equipment or variables outside specified limits.
SR 3.0.2	The specified Frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency, as measured from the previous performance or as measured from the time a specified condition of the Frequency is met. For Frequencies specified as "once," the above interval extension does not apply. If a Completion Time requires periodic performance on a "once per . . ." basis, the above Frequency extension applies to each performance after the initial performance. Exceptions to this Specification are stated in the individual Specifications.
SR 3.0.3	If it is discovered that a Surveillance was not performed within its specified Frequency, then compliance with the requirement to declare the LCO not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified Frequency, whichever is greater. This delay period is permitted to allow performance of the Surveillance. A risk evaluation shall be performed for any Surveillance delayed greater than 24 hours and the risk impact shall be managed. If the Surveillance is not performed within the delay period, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered. When the Surveillance is performed within the delay period and the Surveillance is not met, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.
SR 3.0.4 Insert 2	~~Entry into a MODE or other specified condition in the Applicability of an LCO shall not be made unless the LCO's Surveillances have been met within their specified Frequency. This provision shall not prevent entry into MODES or other specified conditions in the Applicability that are~~

SR Applicability

SR 3.0.4 (continued)

required to comply with ACTIONS or that are part of a shutdown of the unit.

SR 3.0.4 is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, and 3.

- REVIEWER'S NOTE -

SR 3.0.4 has been revised so that changes in MODES or other specified conditions in the Applicability that are part of a shutdown of the unit shall not be prevented. In addition, SR 3.0.4 has been revised so that it is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, and 3. The MODE change restrictions in SR 3.0.4 were previously applicable in all MODES. Before this version of SR 3.0.4 can be implemented on a plant-specific basis, the licensee must review the existing technical specifications to determine where specific restrictions on MODE changes or Required Actions should be included in individual LCOs to justify this change; such an evaluation should be summarized in a matrix of all existing LCOs to facilitate NRC staff review of a conversion to the STS.

REVISION HISTORY

REVISION	TSTF	DESCRIPTION	APPROVED
2.1	TSTF-358, R.6	Missed Surveillance Requirement	10/01/01

3.3 INSTRUMENTATION

3.3.3.1 Post Accident Monitoring (PAM) Instrumentation

LCO 3.3.3.1 The PAM instrumentation for each Function in Table 3.3.3.1-1 shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

- NOTES -

1. ~~LCO 3.0.4 is not applicable.~~
2. Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more Functions with one required channel inoperable.	A.1	Restore required channel to OPERABLE status.	30 days
B. Required Action and associated Completion Time of Condition A not met.	B.1	Initiate action in accordance with Specification 5.6.7.	Immediately
C. **- NOTE -** Not applicable to [hydrogen monitor] channels. One or more Functions with two required channels inoperable.	C.1	Restore one required channel to OPERABLE status.	7 days
D. Two [required hydrogen monitor] channels inoperable.	D.1	Restore one [required hydrogen monitor] channel to OPERABLE status.	72 hours

3.3 INSTRUMENTATION

3.3.3.2 Remote Shutdown System

LCO 3.3.3.2 The Remote Shutdown System Functions shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

- NOTES -

1. ~~LCO 3.0.4 is not applicable.~~
2. Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required Functions inoperable.	A.1	Restore required Function to OPERABLE status.	30 days
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.3.2.1	[Perform CHANNEL CHECK for each required instrumentation channel that is normally energized.	31 days]
SR 3.3.3.2.2	Verify each required control circuit and transfer switch is capable of performing the intended function.	[18] month
SR 3.3.3.2.3	Perform CHANNEL CALIBRATION for each required instrumentation channel.	[18] months

3.3 INSTRUMENTATION

3.3.6.3 Low-Low Set (LLS) Instrumentation

LCO 3.3.6.3 The LLS valve instrumentation for each Function in Table 3.3.6.3-1 shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One LLS valve inoperable due to inoperable channel(s).	A.1	Restore channel(s) to OPERABLE status.	24 hours
B. One or more safety/relief valves (S/RVs) with one Function 3 channel inoperable.	B.1	~~- NOTE - LCO 3.0.4 is not applicable.~~ Restore tailpipe pressure switches to OPERABLE status.	Prior to entering MODE 2 or 3 from MODE 4
C. - NOTE - Separate Condition entry is allowed for each S/RV. One or more S/RVs with two Function 3 channels inoperable.	C.1	Restore one tailpipe pressure switch to OPERABLE status.	[14] days

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.6 RCS Leakage Detection Instrumentation

LCO 3.4.6 The following RCS leakage detection instrumentation shall be OPERABLE:

a. Drywell floor drain sump monitoring system,

b. One channel of either primary containment atmospheric particulate or atmospheric gaseous monitoring system, and

[c. Primary containment air cooler condensate flow rate monitoring system.]

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

- NOTE -

~~LCO 3.0.4 is not applicable.~~

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Drywell floor drain sump monitoring system inoperable.	A.1 Restore drywell floor drain sump monitoring system to OPERABLE status.	30 days
B. Required primary containment atmospheric monitoring system inoperable.	B.1 Analyze grab samples of primary containment atmosphere. <u>AND</u> B.2 [Restore required primary containment atmospheric monitoring system to OPERABLE status.	Once per 12 hours 30 days]

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.7 RCS Specific Activity

LCO 3.4.7 The specific activity of the reactor coolant shall be limited to DOSE EQUIVALENT I-131 specific activity ≤ [0.2] μCi/gm.

APPLICABILITY: MODE 1,
MODES 2 and 3 with any main steam line not isolated.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Reactor coolant specific activity > [0.2] μCi/gm and ≤ 4.0 μCi/gm DOSE EQUIVALENT I-131.	~~- NOTE - LCO 3.0.4 is not applicable.~~	Insert 7
	A.1 Determine DOSE EQUIVALENT I-131.	Once per 4 hours
	<u>AND</u>	
	A.2 Restore DOSE EQUIVALENT I-131 to within limits.	48 hours
B. Required Action and associated Completion Time of Condition A not met. <u>OR</u> Reactor Coolant specific activity >[4.0] μCi/gm Dose EQUIVALENT I-131.	B.1 Determine DOSE EQUIVALENT I-131.	Once per 4 hours
	<u>AND</u>	
	B.2.1 Isolate all main steam lines.	12 hours
	<u>OR</u>	
	B.2.2.1 Be in MODE 3.	12 hours
	<u>AND</u>	

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.8 Residual Heat Removal (RHR) Shutdown Cooling System - Hot Shutdown

LCO 3.4.8

Two RHR shutdown cooling subsystems shall be OPERABLE, and, with no recirculation pump in operation, at least one RHR shutdown cooling subsystem shall be in operation.

- NOTES -

1. Both RHR shutdown cooling subsystems and recirculation pumps may be not in operation for up to 2 hours per 8 hours period.

2. One RHR shutdown cooling subsystem may be inoperable for up to 2 hours for the performance of Surveillances.

APPLICABILITY: MODE 3, with reactor steam dome pressure < [the RHR cut in permissive pressure].

ACTIONS

- NOTES -

1. ~~LCO 3.0.4 is not applicable.~~

2. Separate Condition entry is allowed for each RHR shutdown cooling subsystem.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or two RHR shutdown cooling subsystems inoperable.	A.1	Initiate action to restore RHR shutdown cooling subsystem(s) to OPERABLE status.	Immediately
	<u>AND</u>		
	A.2	Verify an alternate method of decay heat removal is available for each inoperable RHR shutdown cooling subsystem.	1 hour
	<u>AND</u>		

3.5 EMERGENCY CORE COOLING SYSTEM (ECCS) AND REACTOR CORE ISOLATION COOLING SYSTEM (RCIC)

3.5.1 ECCS - Operating

LCO 3.5.1 Each ECCS injection/spray subsystem and the Automatic Depressurization System (ADS) function of [seven] safety/relief valves shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3, except high pressure coolant injection (HPCI) and ADS valves are not required to be OPERABLE with reactor steam dome pressure ≤ [150] psig.

BWR4 Insert 1

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One low pressure ECCS injection/spray subsystem inoperable. <u>OR</u> One LPCI pump in both LPCI subsystems inoperable.	A.1	Restore low pressure ECCS injection/spray subsystem(s) to OPERABLE status.	7 days
B. Required Action and associated Completion Time of Condition A not met.	B.1	Be in MODE 3.	12 hours
	<u>AND</u>		
	B.2	Be in MODE 4.	36 hours
C. HPCI System inoperable.	C.1	Verify by administrative means RCIC System is OPERABLE.	Immediately
	<u>AND</u>		
	C.2	Restore HPCI System to OPERABLE status.	14 days

3.5 EMERGENCY CORE COOLING SYSTEM (ECCS) AND REACTOR CORE ISOLATION COOLING SYSTEM (RCIC)

3.5.3 RCIC System

LCO 3.5.3 The RCIC System shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3 with reactor steam dome pressure > [150] psig.

BWR4 Insert 2

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. RCIC System inoperable.	A.1	Verify by administrative means High Pressure Coolant Injection System is OPERABLE.	Immediately
	AND		
	A.2	Restore RCIC System to OPERABLE status.	14 days
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	12 hours
	AND		
	B.2	Reduce reactor steam dome pressure to ≤ [150] psig.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.3.1	Verify the RCIC System piping is filled with water from the pump discharge valve to the injection valve.	31 days

3.6 CONTAINMENT SYSTEMS

3.6.3.1 Primary Containment Hydrogen Recombiners (if permanently installed)

LCO 3.6.3.1 Two primary containment hydrogen recombiners shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One primary containment hydrogen recombiner inoperable.	A.1 ~~- NOTE - LCO 3.0.4 is not applicable.~~ Restore primary containment hydrogen recombiner to OPERABLE status.	30 days
B. [Two primary containment hydrogen recombiners inoperable.	B.1 Verify by administrative means that the hydrogen control function is maintained. <u>AND</u> B.2 Restore one primary containment hydrogen recombiner to OPERABLE status.	1 hour <u>AND</u> Once per 12 hours thereafter 7 days]
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3.	12 hours

3.6 CONTAINMENT SYSTEMS

3.6.3.2 [Drywell Cooling System Fans]

LCO 3.6.3.2 Two [drywell cooling system fans] shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One [required] [drywell cooling system fan] inoperable.	A.1	~~- NOTE - LCO 3.0.4 is not applicable.~~	
		Restore [required] [drywell cooling system fan] to OPERABLE status.	30 days
B. Two [required] [drywell cooling system fans] inoperable.	B.1	Verify by administrative means that the hydrogen control function is maintained.	1 hour <u>AND</u> Once per 12 hours thereafter
	<u>AND</u>		
	B.2	Restore one [required] [drywell cooling system fan] to OPERABLE status.	7 days
C. Required Action and Associated Completion Time not met.	C.1	Be in MODE 3.	12 hours

3.6 CONTAINMENT SYSTEMS

3.6.3.4 Containment Atmosphere Dilution (CAD) System

LCO 3.6.3.4 Two CAD subsystems shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One CAD subsystem inoperable.	A.1	~~**- NOTE -** LCO 3.0.4 is not applicable.~~ Restore CAD subsystem to OPERABLE status.	 30 days
B. **[** Two CAD subsystems inoperable.	B.1	Verify by administrative means that the hydrogen control function is maintained.	1 hour <u>AND</u> Once per 12 hours thereafter
	<u>AND</u>		
	B.2	Restore one CAD subsystem to OPERABLE status.	7 days **]**
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	12 hours

3.7 PLANT SYSTEMS

3.7.3 Diesel Generator (DG) [1B] Standby Service Water (SSW) System

LCO 3.7.3 The DG [1B] SSW System shall be OPERABLE.

APPLICABILITY: When DG [1B] is required to be OPERABLE.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. DG [1B] SSW System inoperable.	~~- NOTE - LCO 3.0.4 is not applicable.~~	
	A.1 Align cooling water to DG [1B] from a Unit [1] plant service water (PSW) subsystem.	8 hours
	<u>AND</u>	
	A.2 Verify cooling water is aligned to DG [1B] from a Unit [1] PSW subsystem.	Once per 31 days
	<u>AND</u>	
	A.3 Restore DG [1B] SSW System to OPERABLE status.	60 days
B. Required Action and Associated Completion Time not met.	B.1 Declare DG [1B] inoperable.	Immediately

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources - Operating

LCO 3.8.1 The following AC electrical power sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electrical Power Distribution System,

b. [Three] diesel generators (DGs), and

[c. Three automatic sequencers. **]**

APPLICABILITY: MODES 1, 2, and 3.

BWR4 Insert 3

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One [required] offsite circuit inoperable.	A.1	Perform SR 3.8.1.1 for OPERABLE [required] offsite circuit.	1 hour <u>AND</u> Once per 8 hours thereafter
	<u>AND</u>		
	A.2	Declare required feature(s) with no offsite power available inoperable when the redundant required feature(s) are inoperable.	24 hours from discovery of no offsite power to one division concurrent with inoperability of redundant required feature(s)
	<u>AND</u>		

BASES

LCO 3.0.3 (continued)

The time limits of LCO 3.0.3 allow 37 hours for the unit to be in MODE 4 when a shutdown is required during MODE 1 operation. If the unit is in a lower MODE of operation when a shutdown is required, the time limit for reaching the next lower MODE applies. If a lower MODE is reached in less time than allowed, however, the total allowable time to reach MODE 4, or other applicable MODE, is not reduced. For example, if MODE 2 is reached in 2 hours, then the time allowed for reaching MODE 3 is the next 11 hours, because the total time for reaching MODE 3 is not reduced from the allowable limit of 13 hours. Therefore, if remedial measures are completed that would permit a return to MODE 1, a penalty is not incurred by having to reach a lower MODE of operation in less than the total time allowed.

In MODES 1, 2, and 3, LCO 3.0.3 provides actions for Conditions not covered in other Specifications. The requirements of LCO 3.0.3 do not apply in MODES 4 and 5 because the unit is already in the most restrictive Condition required by LCO 3.0.3. The requirements of LCO 3.0.3 do not apply in other specified conditions of the Applicability (unless in MODE 1, 2, or 3) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken.

Exceptions to LCO 3.0.3 are provided in instances where requiring a unit shutdown, in accordance with LCO 3.0.3, would not provide appropriate remedial measures for the associated condition of the unit. An example of this is in LCO 3.7.8, "Spent Fuel Storage Pool Water Level." LCO 3.7.8 has an Applicability of "During movement of irradiated fuel assemblies in the spent fuel storage pool." Therefore, this LCO can be applicable in any or all MODES. If the LCO and the Required Actions of LCO 3.7.8 are not met while in MODE 1, 2, or 3, there is no safety benefit to be gained by placing the unit in a shutdown condition. The Required Action of LCO 3.7.8 of "Suspend movement of irradiated fuel assemblies in the spent fuel storage pool" is the appropriate Required Action to complete in lieu of the actions of LCO 3.0.3. These exceptions are addressed in the individual Specifications.

LCO 3.0.4

Insert 3

~~LCO 3.0.4 establishes limitations on changes in MODES or other specified conditions in the Applicability when an LCO is not met. It precludes placing the unit in a MODE or other specified condition stated in that Applicability (e.g., Applicability desired to be entered) when the following exist:~~

~~a. Unit conditions are such that the requirements of the LCO would not be met in the Applicability desired to be entered and~~

BASES

LCO 3.0.4 (continued)

b. Continued noncompliance with the LCO requirements, if the Applicability were entered, would result in the unit being required to exit the Applicability desired to be entered to comply with the Required Actions.

Compliance with Required Actions that permit continued operation of the unit for an unlimited period of time in a MODE or other specified condition provides an acceptable level of safety for continued operation. This is without regard to the status of the unit before or after the MODE change. Therefore, in such cases, entry into a MODE or other specified condition in the Applicability may be made in accordance with the provisions of the Required Actions. The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before entering an associated MODE or other specified condition in the Applicability.

The provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that result from any unit shutdown.

Exceptions to LCO 3.0.4 are stated in the individual Specifications. These exceptions allow entry into MODES or other specified conditions in the Applicability when the associated ACTIONS to be entered do not provide for continued operation for an unlimited period of time. Exceptions may apply to all the ACTIONS or to a specific Required Action of a Specification.

LCO 3.0.4 is only applicable when entering MODE 3 from MODE 4, MODE 2 from MODE 3 or 4, or MODE 1 from MODE 2. Furthermore, LCO 3.0.4 is applicable when entering any other specified condition in the Applicability only while operating in MODE 1, 2, or 3. The requirements of LCO 3.0.4 do not apply in MODES 4 and 5, or in other specified conditions of the Applicability (unless in MODE 1, 2, or 3) because the ACTIONS of individual specifications sufficiently define the remedial measures to be taken. **[** In some cases (e.g., ..) these ACTIONS provide a Note that states "While this LCO is not met, entry into a MODE or other specified condition in the Applicability is not permitted, unless required to comply with ACTIONS." This Note is a requirement explicitly precluding entry into a MODE or other specified condition of the Applicability. **]**

BASES

LCO 3.0.4 (continued)

~~Surveillances do not have to be performed on the associated inoperable equipment (or on variables outside the specified limits), as permitted by SR 3.0.1. Therefore, changing MODES or other specified conditions while in an ACTIONS Condition, either in compliance with LCO 3.0.4 or where an exception to LCO 3.0.4 is stated, is not a violation of SR 3.0.1 or SR 3.0.4 for those Surveillances that do not have to be performed due to the associated inoperable equipment. However, SRs must be met to ensure OPERABILITY prior to declaring the associated equipment OPERABLE (or variable within limits) and restoring compliance with the affected LCO.~~

LCO 3.0.5

LCO 3.0.5 establishes the allowance for restoring equipment to service under administrative controls when it has been removed from service or declared inoperable to comply with ACTIONS. The sole purpose of this Specification is to provide an exception to LCO 3.0.2 (e.g., to not comply with the applicable Required Action(s)) to allow the performance of required testing to demonstrate either:

a. The OPERABILITY of the equipment being returned to service or

b. The OPERABILITY of other equipment.

The administrative controls ensure the time the equipment is returned to service in conflict with the requirements of the ACTIONS is limited to the time absolutely necessary to perform the required testing to demonstrate OPERABILITY. This Specification does not provide time to perform any other preventive or corrective maintenance.

An example of demonstrating the OPERABILITY of the equipment being returned to service is reopening a containment isolation valve that has been closed to comply with Required Actions and must be reopened to perform the required testing.

An example of demonstrating the OPERABILITY of other equipment is taking an inoperable channel or trip system out of the tripped condition to prevent the trip function from occurring during the performance of required testing on another channel in the other trip system. A similar example of demonstrating the OPERABILITY of other equipment is taking an inoperable channel or trip system out of the tripped condition to permit the logic to function and indicate the appropriate response during the performance of required testing on another channel in the same trip system.

BASES

SR 3.0.4

~~SR 3.0.4 establishes the requirement that all applicable SRs must be met before entry into a MODE or other specified condition in the Applicability.~~

~~This Specification ensures that system and component OPERABILITY requirements and variable limits are met before entry into MODES or other specified conditions in the Applicability for which these systems and components ensure safe operation of the unit.~~

~~The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before entering an associated MODE or other specified condition in the Applicability.~~

Insert 4

~~However, in certain circumstances, failing to meet an SR will not result in SR 3.0.4 restricting a MODE change or other specified condition change. When a system, subsystem, division, component, device, or variable is inoperable or outside its specified limits, the associated SR(s) are not required to be performed, per SR 3.0.1, which states that surveillances do not have to be performed on inoperable equipment. When equipment is inoperable, SR 3.0.4 does not apply to the associated SR(s) since the requirement for the SR(s) to be performed is removed. Therefore, failing to perform the Surveillance(s) within the specified Frequency does not result in an SR 3.0.4 restriction to changing MODES or other specified conditions of the Applicability. However, since the LCO is not met in this instance, LCO 3.0.4 will govern any restrictions that may (or may not) apply to MODE or other specified condition changes.~~

~~The provisions of SR 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that result from any unit shutdown.~~

~~The precise requirements for performance of SRs are specified such that exceptions to SR 3.0.4 are not necessary. The specific time frames and conditions necessary for meeting the SRs are specified in the Frequency, in the Surveillance, or both. This allows performance of Surveillances when the prerequisite condition(s) specified in a Surveillance procedure require entry into the MODE or other specified condition in the Applicability of the associated LCO prior to the performance or completion of a Surveillance. A Surveillance that could not be performed until after entering the LCO Applicability, would have its Frequency specified such that it is not "due" until the specific conditions needed are met. Alternately, the Surveillance may be stated in the form of a Note as not required (to be met or performed) until a particular event, condition, or time has been reached. Further discussion of the specific formats of SRs' annotation is found in Section 1.4, Frequency.~~

BASES

SR 3.0.4 (continued)

~~SR 3.0.4 is only applicable when entering MODE 3 from MODE 4, MODE 2 from MODE 3 or 4, or MODE 1 from MODE 2. Furthermore, SR 3.0.4 is applicable when entering any other specified condition in the Applicability only while operating in MODE 1, 2, or 3. The requirements of SR 3.0.4 do not apply in MODES 4 and 5, or in other specified conditions of the Applicability (unless in MODE 1, 2, or 3) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken.~~

REVISION HISTORY

REVISION	TSTF	DESCRIPTION	APPROVED
2.1	TSTF-358, R.6	Missed Surveillance Requirement	10/01/01

BASES

LCO (continued)

13. Suppression Pool Water Temperature

Suppression pool water temperature is a Category I variable provided to detect a condition that could potentially lead to containment breach and to verify the effectiveness of ECCS actions taken to prevent containment breach. The suppression pool water temperature instrumentation allows operators to detect trends in suppression pool water temperature in sufficient time to take action to prevent steam quenching vibrations in the suppression pool. Twenty-four temperature sensors are arranged in six groups of four independent and redundant channels, located such that there is a group of sensors within a 30 ft line of sight of each relief valve discharge location.

Thus, six groups of sensors are sufficient to monitor each relief valve discharge location. Each group of four sensors includes two sensors for normal suppression pool temperature monitoring and two sensors for PAM. The outputs for the PAM sensors are recorded on four independent recorders in the control room (channels A and C are redundant to channels B and D, respectively). All four of these recorders must be OPERABLE to furnish two channels of PAM indication for each of the relief valve discharge locations. These recorders are the primary indication used by the operator during an accident. Therefore, the PAM Specification deals specifically with this portion of the instrument channels. Each suppression pool water temperature [relief valve discharge location] is treated separately and each [relief valve discharge location] is considered to be a separate function. Therefore, separate Condition entry is allowed for each inoperable [relief valve discharge location.]

APPLICABILITY

The PAM instrumentation LCO is applicable in MODES 1 and 2. These variables are related to the diagnosis and preplanned actions required to mitigate DBAs. The applicable DBAs are assumed to occur in MODES 1 and 2. In MODES 3, 4, and 5, plant conditions are such that the likelihood of an event that would require PAM instrumentation is extremely low; therefore, PAM instrumentation is not required to be OPERABLE in these MODES.

ACTIONS

~~Note 1 has been added to the ACTIONS to exclude the MODE change restriction of LCO 3.0.4. This exception allows entry into the applicable MODE while relying on the ACTIONS even though the ACTIONS may eventually require plant shutdown. This exception is acceptable due to the passive function of the instruments, the operator's ability to diagnose~~

BASES

ACTIONS (continued)

an accident using ~~alternative~~ instruments and ~~methods~~, and the low probability of ~~an event~~ requiring these instruments.

A

Note ~~2~~ has been provided to modify the ACTIONS related to PAM instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable PAM instrumentation channels provide appropriate compensatory measures for separate Functions. As such, a Note has been provided that allows separate Condition entry for each inoperable PAM Function.

A.1

When one or more Functions have one required channel that is inoperable, the required inoperable channel must be restored to OPERABLE status within 30 days. The 30 day Completion Time is based on operating experience and takes into account the remaining OPERABLE channels (or, in the case of a Function that has only one required channel, other non-Regulatory Guide 1.97 instrument channels to monitor the Function), the passive nature of the instrument (no critical automatic action is assumed to occur from these instruments), and the low probability of an event requiring PAM instrumentation during this interval.

B.1

If a channel has not been restored to OPERABLE status in 30 days, this Required Action specifies initiation of action in accordance with Specification 5.6.7, which requires a written report to be submitted to the NRC. This report discusses the results of the root cause evaluation of the inoperability and identifies proposed restorative actions. This action is appropriate in lieu of a shutdown requirement, since alternative actions are identified before loss of functional capability, and given the likelihood of plant conditions that would require information provided by this instrumentation.

BASES

ACTIONS

~~A Note is included that excludes the MODE change restriction of LCO 3.0.4. This exception allows entry into an applicable MODE while relying on the ACTIONS even though the ACTIONS may eventually require a plant shutdown. This exception is acceptable due to the low probability of an event requiring this system.~~

A Remote Shutdown System Division is inoperable when each function is not accomplished by at least one designated Remote Shutdown System channel that satisfies the OPERABILITY criteria for the channel's Function. These criteria are outlined in the LCO section of the Bases.

A

Note ~~2~~ has been provided to modify the ACTIONS related to Remote Shutdown System Functions. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable Remote Shutdown System Functions provide appropriate compensatory measures for separate Functions. As such, a Note has been provided that allows separate Condition entry for each inoperable Remote Shutdown System Function.

A.1

Condition A addresses the situation where one or more required Functions of the Remote Shutdown System is inoperable. This includes the control and transfer switches for any required Function.

The Required Action is to restore the Function (both divisions, if applicable) to OPERABLE status within 30 days. The Completion Time is based on operating experience and the low probability of an event that would require evacuation of the control room.

B.1

If the Required Action and associated Completion Time of Condition A are not met, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours. The allowed Completion Time is reasonable, based on operating experience, to reach the required MODE from full power conditions in an orderly manner and without challenging plant systems.

BASES

ACTIONS (continued)

24 hours is provided to restore the inoperable channel(s) to OPERABLE status (Required Action A.1). If the inoperable channel(s) cannot be restored to OPERABLE status within the allowable out of service time, Condition D must be entered and its Required Action taken. The Required Actions do not allow placing the channel in trip since this action could result in an instrumented LLS valve actuation. The 24 hour Completion Time is considered appropriate because of the redundancy in the design (four LLS valves are provided and any one LLS valve can perform the LLS function) and the very low probability of multiple LLS instrumentation channel failures, which render the remaining LLS S/RVs inoperable, occurring together with an event requiring the LLS function during the 24 hour Completion Time. The 24 hour Completion Time is also based on the reliability analysis of Reference 3.

B.1

Although the LLS circuitry is designed so that operation of a single tailpipe pressure switch will result in arming both LLS logics in its associated division, each tailpipe pressure switch provides a direct input to only one LLS logic (e.g., Logic A). Since each LLS logic normally receives at least five S/RV pressure switch inputs (and also receives the other S/RV signals from the other logic in the same division by an arming signal), the LLS logic and instrumentation remains capable of performing its safety function if any S/RV tailpipe pressure switch instrument channel becomes inoperable. Therefore, it is acceptable for plant operation to continue with only one tailpipe pressure switch OPERABLE on each S/RV. However, this is only acceptable provided each LLS valve is OPERABLE. (Refer to Required Action A.1 and D.1 Bases).

Required Action B.1 requires restoration of the tailpipe pressure switches to OPERABLE status prior to entering MODE 2 or 3 from MODE 4 to ensure that all switches are OPERABLE at the beginning of a reactor startup (this is because the switches are not accessible during plant operation). The Required Actions do not allow placing the channel in trip since this action could result in a LLS valve actuation. ~~As noted, LCO 3.0.4 is not applicable, thus allowing entry into MODE 1 from MODE 2 with inoperable channels. This allowance is needed since the channels only have to be repaired prior to entering MODE 2 from MODE 3 or MODE 4. Yet, LCO 3.0.4 would preclude entry into MODE 1 from MODE 2 since the Required Action does not allow unlimited operations.~~

BASES

LCO

The drywell floor drain sump monitoring system is required to quantify the unidentified LEAKAGE from the RCS. Thus, for the system to be considered OPERABLE, either the flow monitoring or the sump level monitoring portion of the system must be OPERABLE. The other monitoring systems provide early alarms to the operators so closer examination of other detection systems will be made to determine the extent of any corrective action that may be required. With the leakage detection systems inoperable, monitoring for LEAKAGE in the RCPB is degraded.

APPLICABILITY

In MODES 1, 2, and 3, leakage detection systems are required to be OPERABLE to support LCO 3.4.4. This Applicability is consistent with that for LCO 3.4.4.

ACTIONS

The Actions are modified by a Note that states that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when the drywell floor drain sump and required radiation monitors are inoperable. This allowance is provided because other instrumentation is available to monitor RCS LEAKAGE.

A.1

With the drywell floor drain sump monitoring system inoperable, no other form of sampling can provide the equivalent information to quantify leakage. However, the primary containment atmospheric activity monitor [and the primary containment air cooler condensate flow rate monitor] will provide indication of changes in leakage.

With the drywell floor drain sump monitoring system inoperable, but with RCS unidentified and total LEAKAGE being determined every 8 hours (SR 3.4.4.1), operation may continue for 30 days. The 30 day Completion Time of Required Action A.1 is acceptable, based on operating experience, considering the multiple forms of leakage detection that are still available.

B.1 and B.2

With both gaseous and particulate primary containment atmospheric monitoring channels inoperable, grab samples of the primary containment atmosphere must be taken and analyzed to provide periodic leakage information. [Provided a sample is obtained and analyzed once every 12 hours, the plant may be operated for up to 30 days to allow restoration of at least one of the required monitors.] [Provided a sample is obtained and analyzed every 12 hours, the plant may continue operation since at

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BASES

APPLICABLE SAFETY ANALYSES (continued)

RCS specific activity satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The specific iodine activity is limited to ≤ [0.2] μCi/gm DOSE EQUIVALENT I-131. This limit ensures the source term assumed in the safety analysis for the MSLB is not exceeded, so any release of radioactivity to the environment during an MSLB is less than a small fraction of the 10 CFR 100 limits.

APPLICABILITY

In MODE 1, and MODES 2 and 3 with any main steam line not isolated, limits on the primary coolant radioactivity are applicable since there is an escape path for release of radioactive material from the primary coolant to the environment in the event of an MSLB outside of primary containment.

In MODES 2 and 3 with the main steam lines isolated, such limits do not apply since an escape path does not exist. In MODES 4 and 5, no limits are required since the reactor is not pressurized and the potential for leakage is reduced.

ACTIONS

A.1 and A.2

When the reactor coolant specific activity exceeds the LCO DOSE EQUIVALENT I-131 limit, but is ≤ 4.0 μCi/gm, samples must be analyzed for DOSE EQUIVALENT I-131 at least once every 4 hours. In addition, the specific activity must be restored to the LCO limit within 48 hours. The Completion Time of once every 4 hours is based on the time needed to take and analyze a sample. The 48 hour Completion Time to restore the activity level provides a reasonable time for temporary coolant activity increases (iodine spikes or crud bursts) to be cleaned up with the normal processing systems.

Insert 8

~~A Note to the Required Actions of Condition A excludes the MODE change restriction of LCO 3.0.4. This exception allows entry into the applicable MODE(S) while relying on the ACTIONS even though the ACTIONS may eventually require plant shutdown.~~ This exception allowance is acceptable due to the significant conservatism incorporated into the specific activity limit, the low probability of an event which is limiting due to exceeding this limit, and the ability to restore transient specific activity excursions while the plant remains at, or proceeds to power operation.

BASES

ACTIONS

A Note to the ACTIONS excludes the MODE change restriction of LCO 3.0.4. This exception allows entry into the applicable MODE(S) while relying on the ACTIONS even though the ACTIONS may eventually require plant shutdown. This exception is acceptable due to the redundancy of the OPERABLE subsystems, the low pressure at which the plant is operating, the low probability of an event occurring during operation in this condition, and the availability of alternate methods of decay heat removal capability.

~~A second Note has been provided to modify the ACTIONS related to RHR shutdown cooling subsystems. Section 1.3, Completion Times, specifies once a Condition has been entered, subsequent divisions, subsystems, components or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable shutdown cooling subsystems provide appropriate compensatory measures for separate inoperable shutdowncooling subsystems. As such, a Note has been provided that allows separate Condition entry for each inoperable RHR shutdown cooling subsystem.~~

<u>A.1, A.2, and A.3</u>

With one required RHR shutdown cooling subsystem inoperable for decay heat removal, except as permitted by LCO Note 2, the inoperable subsystem must be restored to OPERABLE status without delay. In this condition, the remaining OPERABLE subsystem can provide the necessary decay heat removal. The overall reliability is reduced, however, because a single failure in the OPERABLE subsystem could result in reduced RHR shutdown cooling capability. Therefore, an alternate method of decay heat removal must be provided.

With both RHR shutdown cooling subsystems inoperable, an alternate method of decay heat removal must be provided in addition to that provided for the initial RHR shutdown cooling subsystem inoperability. This re-establishes backup decay heat removal capabilities, similar to the requirements of the LCO. The 1 hour Completion Time is based on the decay heat removal function and the probability of a loss of the available decay heat removal capabilities.

The required cooling capacity of the alternate method should be ensured by verifying (by calculation or demonstration) its capability to maintain or reduce temperature. Decay heat removal by ambient losses can be

BASES

LCO (continued)

HPCI System. The low pressure ECCS injection/spray subsystems are defined as the two CS subsystems and the two LPCI subsystems.

With less than the required number of ECCS subsystems OPERABLE, the potential exists that during a limiting design basis LOCA concurrent with the worst case single failure, the limits specified in Reference 10 could be exceeded. All ECCS subsystems must therefore be OPERABLE to satisfy the single failure criterion required by Reference 10.

LPCI subsystems may be considered OPERABLE during alignment and operation for decay heat removal when below the actual RHR cut in permissive pressure in MODE 3, if capable of being manually realigned (remote or local) to the LPCI mode and not otherwise inoperable. At these low pressures and decay heat levels, a reduced complement of ECCS subsystems should provide the required core cooling, thereby allowing operation of RHR shutdown cooling when necessary.

APPLICABILITY

All ECCS subsystems are required to be OPERABLE during MODES 1, 2, and 3, when there is considerable energy in the reactor core and core cooling would be required to prevent fuel damage in the event of a break in the primary system piping. In MODES 2 and 3, when reactor steam dome pressure is ≤ 150 psig, ADS and HPCI are not required to be OPERABLE because the low pressure ECCS subsystems can provide sufficient flow below this pressure. ECCS requirements for MODES 4 and 5 are specified in LCO 3.5.2, "ECCS - Shutdown."

ACTIONS

BWR4 Insert 1B

A.1

If any one low pressure ECCS injection/spray subsystem is inoperable, or if one LPCI pump in both LPCI subsystems is inoperable, the inoperable subsystem(s) must be restored to OPERABLE status within 7 days. In this Condition, the remaining OPERABLE subsystems provide adequate core cooling during a LOCA. However, overall ECCS reliability is reduced, because a single failure in one of the remaining OPERABLE subsystems, concurrent with a LOCA, may result in the ECCS not being able to perform its intended safety function. The 7 day Completion Time is based on a reliability study (Ref. 12) that evaluated the impact on ECCS availability, assuming various components and subsystems were taken out of service. The results were used to calculate the average availability of ECCS equipment needed to mitigate the consequences of a LOCA as a function of allowed outage times (i.e., Completion Times).

BASES

BACKGROUND (continued)

kept full of water. The RCIC System is normally aligned to the CST. The height of water in the CST is sufficient to maintain the piping full of water up to the first isolation valve. The relative height of the feedwater line connection for RCIC is such that the water in the feedwater lines keeps the remaining portion of the RCIC discharge line full of water. Therefore, RCIC does not require a "keep fill" system.

APPLICABLE SAFETY ANALYSES

The function of the RCIC System is to respond to transient events by providing makeup coolant to the reactor. The RCIC System is not an Engineered Safety Feature System and no credit is taken in the safety analyses for RCIC System operation. The RCIC System satisfies Criterion 4 of 10 CFR 50.36(c)(2)(ii).

LCO

The OPERABILITY of the RCIC System provides adequate core cooling such that actuation of any of the low pressure ECCS subsystems is not required in the event of RPV isolation accompanied by a loss of feedwater flow. The RCIC System has sufficient capacity for maintaining RPV inventory during an isolation event.

APPLICABILITY

The RCIC System is required to be OPERABLE during MODE 1, and MODES 2 and 3 with reactor steam dome pressure > 150 psig, since RCIC is the primary non-ECCS water source for core cooling when the reactor is isolated and pressurized. In MODES 2 and 3 with reactor steam dome pressure ≤ 150 psig, and in MODES 4 and 5, RCIC is not required to be OPERABLE since the low pressure ECCS injection/spray subsystems can provide sufficient flow to the RPV.

ACTIONS

BWR4 Insert 2B

A.1 and A.2

If the RCIC System is inoperable during MODE 1, or MODE 2 or 3 with reactor steam dome pressure > [150] psig, and the HPCI System is verified to be OPERABLE, the RCIC System must be restored to OPERABLE status within 14 days. In this Condition, loss of the RCIC System will not affect the overall plant capability to provide makeup inventory at high reactor pressure since the HPCI System is the only high pressure system assumed to function during a loss of coolant accident (LOCA). OPERABILITY of HPCI is therefore verified immediately when the RCIC System is inoperable. This may be performed as an administrative check, by examining logs or other information, to determine if HPCI is out of service for maintenance or other reasons. It does not mean it is necessary to perform the Surveillances needed to

BASES

APPLICABILITY

In MODES 1 and 2, the two primary containment hydrogen recombiners are required to control the hydrogen concentration within primary containment below its flammability limit of 4.0 v/o following a LOCA, assuming a worst case single failure.

In MODE 3, both the hydrogen production rate and the total hydrogen produced after a LOCA would be less than that calculated for the DBA LOCA. Also, because of the limited time in this MODE, the probability of an accident requiring the primary containment hydrogen recombiner is low. Therefore, the primary containment hydrogen recombiner is not required in MODE 3.

In MODES 4 and 5, the probability and consequences of a LOCA are low due to the pressure and temperature limitations in these MODES. Therefore, the primary containment hydrogen recombiner is not required in these MODES.

ACTIONS

A.1

With one primary containment hydrogen recombiner inoperable, the inoperable recombiner must be restored to OPERABLE status within 30 days. In this Condition, the remaining OPERABLE recombiner is adequate to perform the hydrogen control function. However, the overall reliability is reduced because a single failure in the OPERABLE recombiner could result in reduced hydrogen control capability. The 30 day Completion Time is based on the low probability of the occurrence of a LOCA that would generate hydrogen in amounts capable of exceeding the flammability limit, the amount of time available after the event for operator action to prevent exceeding this limit, and the low probability of failure of the OPERABLE primary containment hydrogen recombiner.

~~Required Action A.1 has been modified by a Note indicating that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when one recombiner is inoperable. This allowance is provided because of the low probability of the occurrence of a LOCA that would generate hydrogen in amounts capable of exceeding the flammability limit, the low probability of the failure of the OPERABLE subsystem, and the amount of time available after a postulated LOCA for operator action to prevent exceeding the flammability limit.~~

BASES

APPLICABILITY (continued)

an accident requiring the [Drywell Cooling System fans] is low. Therefore, the [Drywell Cooling System fans] are not required in MODE 3.

In MODES 4 and 5, the probability and consequences of a LOCA are reduced due to the pressure and temperature limitations in these MODES. Therefore, the [Drywell Cooling System fans] are not required in these MODES.

ACTIONS

A.1

With one [required] [Drywell Cooling System fan] inoperable, the inoperable fan must be restored to OPERABLE status within 30 days. In this Condition, the remaining OPERABLE fan is adequate to perform the hydrogen mixing function. However, the overall reliability is reduced because a single failure in the OPERABLE fan could result in reduced hydrogen mixing capability. The 30 day Completion Time is based on the availability of the second fan, the low probability of the occurrence of a LOCA that would generate hydrogen in amounts capable of exceeding the flammability limit, the amount of time available after the event for operator action to prevent exceeding this limit, and the availability of the Primary Containment Hydrogen Recombiner System and the Containment Atmosphere Dilution System.

~~Required Action A.1 has been modified by a Note indicating that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when one [Drywell Cooling System fan] is inoperable. This allowance is provided because of the low probability of the occurrence of a LOCA that would generate hydrogen in amounts capable of exceeding the flammability limit, the low probability of the failure of the OPERABLE fan, and the amount of time available after a postulated LOCA for operator action to prevent exceeding the flammability limit.~~

B.1 and B.2

- REVIEWER'S NOTE -

This Condition is only allowed for units with an alternate hydrogen control system acceptable to the technical staff.

With two [Drywell Cooling System fans] inoperable, the ability to perform the hydrogen control function via alternate capabilities must be verified by administrative means within 1 hour. The alternate hydrogen control

BASES

LCO	Two CAD subsystems must be OPERABLE. This ensures operation of at least one CAD subsystem in the event of a worst case single active failure. Operation of at least one CAD subsystem is designed to maintain primary containment post-LOCA oxygen concentration < 5.0 v/o for 7 days.
APPLICABILITY	In MODES 1 and 2, the CAD System is required to maintain the oxygen concentration within primary containment below the flammability limit of 5.0 v/o following a LOCA. This ensures that the relative leak tightness of primary containment is adequate and prevents damage to safety related equipment and instruments located within primary containment. In MODE 3, both the hydrogen and oxygen production rates and the total amounts produced after a LOCA would be less than those calculated for the Design Basis Accident LOCA. Thus, if the analysis were to be performed starting with a LOCA in MODE 3, the time to reach a flammable concentration would be extended beyond the time conservatively calculated for MODES 1 and 2. The extended time would allow hydrogen removal from the primary containment atmosphere by other means and also allow repair of an inoperable CAD subsystem, if CAD were not available. Therefore, the CAD System is not required to be OPERABLE in MODE 3. In MODES 4 and 5, the probability and consequences of a LOCA are reduced due to the pressure and temperature limitations of these MODES. Therefore, the CAD System is not required to be OPERABLE in MODES 4 and 5.
ACTIONS	<u>A.1</u> If one CAD subsystem is inoperable, it must be restored to OPERABLE status within 30 days. In this Condition, the remaining OPERABLE CAD subsystem is adequate to perform the oxygen control function. However, the overall reliability is reduced because a single failure in the OPERABLE subsystem could result in reduced oxygen control capability. The 30 day Completion Time is based on the low probability of the occurrence of a LOCA that would generate hydrogen and oxygen in amounts capable of exceeding the flammability limit, the amount of time available after the event for operator action to prevent exceeding this limit, and the availability of the OPERABLE CAD subsystem and other hydrogen mitigating systems. Required Action A.1 has been modified by a Note that indicates that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change

BASES

ACTIONS (continued)

~~is allowed when one CAD subsystem is inoperable. This allowance is provided because of the low probability of the occurrence of a LOCA that would generate hydrogen and oxygen in amounts capable of exceeding the flammability limit, the low probability of the failure of the OPERABLE subsystem, the amount of time available after a postulated LOCA for operator action to prevent exceeding the flammability limit, and the availability of other hydrogen mitigating systems.~~

B.1 and B.2

- REVIEWER'S NOTE -

This Condition is only allowed for plants with an alternate hydrogen control system acceptable to the technical staff.

With two CAD subsystems inoperable, the ability to perform the hydrogen control function via alternate capabilities must be verified by administrative means within 1 hour. The alternate hydrogen control capabilities are provided by the [Primary Containment Inerting System or one hydrogen recombiner and one Drywell Cooling System fan]. The 1 hour Completion Time allows a reasonable period of time to verify that a loss of hydrogen control function does not exist.

- REVIEWER'S NOTE -

The following is to be used if a non-Technical Specification alternate hydrogen control function is used to justify this Condition: In addition, the alternate hydrogen control system capability must be verified once per 12 hours thereafter to ensure its continued availability.

[Both] the [initial] verification [and all subsequent verifications] may be performed as an administrative check by examining logs or other information to determine the availability of the alternate hydrogen control system. It does not mean to perform the Surveillances needed to demonstrate OPERABILITY of the alternate hydrogen control system. If the ability to perform the hydrogen control function is maintained, continued operation is permitted with two CAD subsystems inoperable for up to 7 days. Seven days is a reasonable time to allow two CAD subsystems to be inoperable because the hydrogen control function is maintained and because of the low probability of the occurrence of a LOCA that would generate hydrogen in amounts capable of exceeding the flammability limit.

BASES

ACTIONS

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

~~The Required Actions are modified by a Note indicating that the LCO 3.0.4 does not apply. As a result, a MODE change is allowed when the DG [1B] SSW System is inoperable, provided the DG [1B] has an adequate cooling water supply from the Unit [1] PSW.~~

If the DG [1B] SSW System is inoperable, the OPERABILITY of the DG [1B] is affected due to loss of its cooling source; however, the capability exists to provide cooling to DG [1B] from the PSW System of Unit [1]. Continued operation is allowed for 60 days if the OPERABILITY of a Unit 1 PSW System, with respect to its capability to provide cooling to the DG [1B], can be verified. This is accomplished by aligning cooling water to DG [1B] from the Unit 1 PSW System within 8 hours and verifying this lineup once every 31 days. The 8 hour Completion Time is based on the time required to reasonably complete the Required Action, and the low probability of an event occurring requiring DG [1B] during this period. The 31 day verification of the Unit [1] PSW lineup to the DG [1B] is consistent with the PSW valve lineup SRs. The 60 day Completion Time to restore the DG [1B] SSW System to OPERABLE status allows sufficient time to repair the system, yet prevents indefinite operation with cooling water provided from the Unit [1] PSW System.

B.1

If cooling water cannot be made available to the DG [1B] within the 8 hour Completion Time, or if cooling water cannot be verified to be aligned to DG [1B] from a Unit [1] PSW subsystem as required by the 31 day verification Required Action, the DG [1B] cannot perform its intended function and must be immediately declared inoperable. In accordance with LCO 3.0.6, this also requires entering into the Applicable Conditions and Required Actions for LCO 3.8.1 or LCO 3.8.2. Additionally, if the DG [1B] SSW System is not restored to OPERABLE status within 60 days, DG [1B] must be immediately declared inoperable.

SURVEILLANCE REQUIREMENTS

SR 3.7.3.1

Verifying the correct alignment for manual, power operated, and automatic valves in the DG [1B] SSW System flow path provides assurance that the proper flow paths will exist for DG [1B] SSW System operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve is also allowed to be in the nonaccident position, and yet be considered in the

BASES

LCO (continued)

undervoltage. This sequence must be accomplished within 12 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and must continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions, such as DG in standby with the engine hot and DG in standby with the engine at ambient condition. Additional DG capabilities must be demonstrated to meet required Surveillances, e.g., capability of the DG to revert to standby status on an ECCS signal while operating in parallel test mode.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.

The AC sources must be separate and independent (to the extent possible) of other AC sources. For the DGs, the separation and independence are complete. For the offsite AC sources, the separation and independence are to the extent practical. A circuit may be connected to more than one ESF bus, with fast transfer capability to the other circuit OPERABLE, and not violate separation criteria. A circuit that is not connected to an ESF bus is required to have OPERABLE fast transfer interlock mechanisms to at least two ESF buses to support OPERABILITY of that circuit.

APPLICABILITY

The AC sources [and sequencers] are required to be OPERABLE in MODES 1, 2, and 3 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The AC power requirements for MODES 4 and 5 are covered in LCO 3.8.2, "AC Sources - Shutdown."

BWR4 Insert 3B

ACTIONS

A.1

To ensure a highly reliable power source remains with one offsite circuit inoperable, it is necessary to verify the availability of the remaining required offsite circuit on a more frequent basis. Since the Required

3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY

LCO 3.0.1

LCOs shall be met during the MODES or other specified conditions in the Applicability, except as provided in LCO 3.0.2 and LCO 3.0.7.

LCO 3.0.2

Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met, except as provided in LCO 3.0.5 and LCO 3.0.6.

If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required unless otherwise stated.

LCO 3.0.3

When an LCO is not met and the associated ACTIONS are not met, an associated ACTION is not provided, or if directed by the associated ACTIONS, the unit shall be placed in a MODE or other specified condition in which the LCO is not applicable. Action shall be initiated within 1 hour to place the unit, as applicable, in:

a. MODE 2 within 7 hours,

b. MODE 3 within 13 hours, and

c. MODE 4 within 37 hours.

Exceptions to this Specification are stated in the individual Specifications.

Where corrective measures are completed that permit operation in accordance with the LCO or ACTIONS, completion of the actions required by LCO 3.0.3 is not required.

LCO 3.0.3 is only applicable in MODES 1, 2, and 3.

LCO 3.0.4

Insert 1

~~When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time. This Specification shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS or that are part of a shutdown of the unit.~~

~~Exceptions to this Specification are stated in the individual Specifications.~~

~~LCO 3.0.4 is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, and 3.~~

LCO Applicability

LCO 3.0.4 (continued)

- **REVIEWER'S NOTE** -

LCO 3.0.4 has been revised so that changes in MODES or other specified conditions in the Applicability that are part of a shutdown of the unit shall not be prevented. In addition, LCO 3.0.4 has been revised so that it is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, and 3. The MODE change restrictions in LCO 3.0.4 were previously applicable in all MODES. Before this version of LCO 3.0.4 can be implemented on a plant-specific basis, the licensee must review the existing technical specifications to determine where specific restrictions on MODE changes or Required Actions should be included in individual LCOs to justify this change; such an evaluation should be summarized in a matrix of all existing LCOs to facilitate NRC staff review of a conversion to the STS.

LCO 3.0.5 Equipment removed from service or declared inoperable to comply with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment. This is an exception to LCO 3.0.2 for the system returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.

LCO 3.0.6 When a supported system LCO is not met solely due to a support system LCO not being met, the Conditions and Required Actions associated with this supported system are not required to be entered. Only the support system LCO ACTIONS are required to be entered. This is an exception to LCO 3.0.2 for the supported system. In this event, an evaluation shall be performed in accordance with Specification 5.5.12, "Safety Function Determination Program (SFDP)." If a loss of safety function is determined to exist by this program, the appropriate Conditions and Required Actions of the LCO in which the loss of safety function exists are required to be entered.

When a support system's Required Action directs a supported system to be declared inoperable or directs entry into Conditions and Required Actions for a supported system, the applicable Conditions and Required Actions shall be entered in accordance with LCO 3.0.2.

LCO 3.0.7 Special Operations LCOs in Section 3.10 allow specified Technical Specifications (TS) requirements to be changed to permit performance of special tests and operations. Unless otherwise specified, all other TS requirements remain LCO 3.0.7 unchanged. Compliance with Special

3.0 SURVEILLANCE REQUIREMENT (SR) APPLICABILITY

SR 3.0.1	SRs shall be met during the MODES or other specified conditions in the Applicability for individual LCOs, unless otherwise stated in the SR. Failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO. Failure to perform a Surveillance within the specified Frequency shall be failure to meet the LCO except as provided in SR 3.0.3. Surveillances do not have to be performed on inoperable equipment or variables outside specified limits.
SR 3.0.2	The specified Frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency, as measured from the previous performance or as measured from the time a specified condition of the Frequency is met. For Frequencies specified as "once," the above interval extension does not apply. If a Completion Time requires periodic performance on a "once per . . ." basis, the above Frequency extension applies to each performance after the initial performance. Exceptions to this Specification are stated in the individual Specifications.
SR 3.0.3	If it is discovered that a Surveillance was not performed within its specified Frequency, then compliance with the requirement to declare the LCO not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified Frequency, whichever is greater. This delay period is permitted to allow performance of the Surveillance. A risk evaluation shall be performed for any Surveillance delayed greater than 24 hours and the risk impact shall be managed. If the Surveillance is not performed within the delay period, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered. When the Surveillance is performed within the delay period and the Surveillance is not met, the LCO must immediately be declared not met, and the applicable Condition(s) must be entered.
SR 3.0.4 Insert 2	Entry into a MODE or other specified condition in the Applicability of an LCO shall not be made unless the LCO's Surveillances have been met within their specified Frequency. This provision shall not prevent entry into MODES or other specified conditions in the Applicability that are

3.0 SR Applicability

SR 3.0.4 (continued)

required to comply with ACTIONS or that are part of a shutdown of the unit.

SR 3.0.4 is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, and 3.

- REVIEWER'S NOTE -

SR 3.0.4 has been revised so that changes in MODES or other specified conditions in the Applicability that are part of a shutdown of the unit shall not be prevented. In addition, SR 3.0.4 has been revised so that it is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, and 3. The MODE change restrictions in SR 3.0.4 were previously applicable in all MODES. Before this version of SR 3.0.4 can be implemented on a plant-specific basis, the licensee must review the existing technical specifications to determine where specific restrictions on MODE changes or Required Actions should be included in individual LCOs to justify this change; such an evaluation should be summarized in a matrix of all existing LCOs to facilitate NRC staff review of a conversion to the STS.

REVISION HISTORY

REVISION	TSTF	DESCRIPTION	APPROVED
2.1	TSTF-358, R.6	Missed Surveillance Requirement	10/01/01

3.3 INSTRUMENTATION

3.3.3.1 Post Accident Monitoring (PAM) Instrumentation

LCO 3.3.3.1 The PAM instrumentation for each Function in Table 3.3.3.1-1 shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

- NOTES -

1. ~~LCO 3.0.4 is not applicable.~~
2. Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more Functions with one required channel inoperable.	A.1	Restore required channel to OPERABLE status.	30 days
B. Required Action and associated Completion Time of Condition A not met.	B.1	Initiate action in accordance with Specification 5.6.7.	Immediately
C. ------------------------- **- NOTE -** Not applicable to [hydrogen monitor] channels. ------------------------- One or more Functions with two required channels inoperable.	C.1	Restore one required channel to OPERABLE status.	7 days
D. Two [required hydrogen monitor] channels inoperable.	D.1	Restore one [required hydrogen monitor] channel to OPERABLE status.	72 hours

3.3 INSTRUMENTATION

3.3.3.2 Remote Shutdown System

LCO 3.3.3.2 The Remote Shutdown System Functions shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

- NOTES -

1. ~~LCO 3.0.4 is not applicable.~~
2. Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required Functions inoperable.	A.1	Restore required Function to OPERABLE status.	30 days
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.3.2.1	[Perform CHANNEL CHECK for each required instrumentation channel that is normally energized.	31 days]
SR 3.3.3.2.2	Verify each required control circuit and transfer switch is capable of performing the intended functions.	[18] months
SR 3.3.3.2.3	Perform CHANNEL CALIBRATION for each required instrumentation channel.	[18] months

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.7 RCS Leakage Detection Instrumentation

LCO 3.4.7 The following RCS leakage detection instrumentation shall be OPERABLE:

a. Drywell floor drain sump monitoring system,

b. One channel of either drywell atmospheric particulate or atmospheric gaseous monitoring system, and

[c. Drywell air cooler condensate flow rate monitoring system.]

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

- NOTE -

~~LCO 3.0.4 is not applicable.~~

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Drywell floor drain sump monitoring system inoperable.	A.1 Restore drywell floor drain sump monitoring system to OPERABLE status.	30 days
B. Required drywell atmospheric monitoring system inoperable.	B.1 Analyze grab samples of drywell atmosphere. AND B.2 [Restore required drywell atmospheric monitoring system to OPERABLE status.	Once per 12 hours 30 days]

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.8 RCS Specific Activity

LCO 3.4.8 The specific activity of the reactor coolant shall be limited to DOSE EQUIVALENT I-131 specific activity Δ [0.2] μCi/gm.

APPLICABILITY: MODE 1,
MODES 2 and 3 with any main steam line not isolated.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Reactor coolant specific activity > [0.2] μCi/gm and ≤ 4.0 μCi/gm DOSE EQUIVALENT I-131.	~~- NOTE - LCO 3.0.4 is not applicable.~~	Insert 7
	A.1 Determine DOSE EQUIVALENT I-131.	Once per 4 hours
	AND	
	A.2 Restore DOSE EQUIVALENT I-131 to within limits.	48 hours
B. Required Action and associated Completion Time of Condition A not met. OR Reactor coolant Specific activity > [4.0] μCi/gm DOSE EQUIVALENT I-131.	B.1 Determine DOSE EQUIVALENT I-131.	Once per 4 hours
	AND	
	B.2.1 Isolate all main steam lines.	12 hours
	OR	
	B.2.2.1 Be in MODE 3.	12 hours
	AND	

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.9 Residual Heat Removal (RHR) Shutdown Cooling System - Hot Shutdown

LCO 3.4.9 Two RHR shutdown cooling subsystems shall be OPERABLE, and, with no recirculation pump in operation, at least one RHR shutdown cooling subsystem shall be in operation.

- NOTES -

1. Both RHR shutdown cooling subsystems and recirculation pumps may be not in operation for up to 2 hours per 8 hours period.

2. One RHR shutdown cooling subsystem may be inoperable for up to 2 hours for performance of Surveillances.

APPLICABILITY: MODE 3 with reactor steam dome pressure < [the RHR cut in permissive pressure].

ACTIONS

- ~~NOTES~~ -

1. ~~LCO 3.0.4 is not applicable.~~

~~2.~~ Separate Condition entry is allowed for each RHR shutdown cooling subsystem.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or two RHR shutdown cooling subsystems inoperable.	A.1	Initiate action to restore RHR shutdown cooling subsystem to OPERABLE status.	Immediately
	AND		

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND REACTOR CORE ISOLATION COOLING SYSTEM (RCIC)

3.5.1 ECCS - Operating

LCO 3.5.1 Each ECCS injection/spray subsystem and the Automatic Depressurization System (ADS) function of [eight] safety/relief valves shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3, except ADS valves are not required to be OPERABLE with reactor steam dome pressure ≤ [150] psig.

BWR6 Insert 1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One low pressure ECCS injection/spray subsystem inoperable.	A.1 Restore low pressure ECCS injection/spray subsystem to OPERABLE status.	7 days
B. High Pressure Core Spray (HPCS) System inoperable.	B.1 Verify by administrative means RCIC System is OPERABLE when RCIC is required to be OPERABLE. AND B.2 Restore HPCS System to OPERABLE status.	Immediately 14 days
C. Two ECCS injection subsystems inoperable. OR One ECCS injection and one ECCS spray subsystem inoperable.	C.1 Restore one ECCS injection/spray subsystem to OPERABLE status.	72 hours

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS) AND REACTOR CORE ISOLATION COOLING SYSTEM (RCIC)

3.5.3 RCIC System

LCO 3.5.3 The RCIC System shall be OPERABLE.

APPLICABILITY: MODE 1,
MODES 2 and 3 with reactor steam dome pressure > [150] psig.

BWR6 Insert 2

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. RCIC System inoperable.	A.1	Verify by administrative means High Pressure Core Spray System is OPERABLE.	Immediately
	AND		
	A.2	Restore RCIC System to OPERABLE status.	14 days
B. Required Action and associated Completion Time not met.	B.1	Be in MODE 3.	12 hours
	AND		
	B.2	Reduce reactor steam dome pressure to ≤ [150] psig.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.5.3.1	Verify the RCIC System piping is filled with water from the pump discharge valve to the injection valve.	31 days

3.6 CONTAINMENT SYSTEMS

3.6.3.1 Primary Containment Hydrogen Recombiners (if permanently installed)

LCO 3.6.3.1 Two primary containment hydrogen recombiners shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One primary containment hydrogen recombiner inoperable.	A.1	~~- NOTE - LCO 3.0.4 is not applicable.~~ Restore primary containment hydrogen recombiner to OPERABLE status.	30 days
B. [Two primary containment hydrogen recombiners inoperable.	B.1	Verify by administrative means that the hydrogen control function is maintained.	1 hour AND One per 12 hours thereafter
	AND		
	B.2	Restore one primary containment hydrogen recombiner to OPERABLE status.	7 days]
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	12 hours

3.6 CONTAINMENT SYSTEMS

3.6.3.2 Primary Containment and Drywell Hydrogen Ignitors

LCO 3.6.3.2 Two divisions of primary containment and drywell hydrogen ignitors shall be OPERABLE, each with > 90% of the associated ignitor assemblies OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One primary containment and drywell hydrogen ignitor division inoperable.	A.1	~~- NOTE -~~ ~~LCO 3.0.4 is not applicable.~~ Restore primary containment and drywell hydrogen ignitor division to OPERABLE status.	30 days
B. Two primary containment and drywell hydrogen ignitor divisions inoperable.	B.1	Verify by administrative means that the hydrogen control function is maintained.	1 hour <u>AND</u> Once per 12 hours thereafter
	<u>AND</u>		
	B.2	Restore one primary containment and drywell hydrogen ignitor division to OPERABLE status.	7 days
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	12 hours

3.6 CONTAINMENT SYSTEMS

3.6.3.3 **[** Drywell Purge System **]**

LCO 3.6.3.3 Two [drywell purge] subsystems shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One [drywell purge] subsystem inoperable.	A.1	~~**- NOTE -** LCO 3.0.4 is not applicable.~~ Restore [drywell purge] subsystem to OPERABLE status.	30 days
B. Two [drywell purge] subsystems inoperable.	B.1	Verify by administrative means that the hydrogen control function is maintained.	1 hour <u>AND</u> Once per 12 hours thereafter
	<u>AND</u>		
	B.2	Restore one [drywell purge] subsystem to OPERABLE status.	7 days
C. Required Action and associated Completion Time not met.	C.1	Be in MODE 3.	12 hours

3.8 ELECTRICAL POWER SYSTEMS

3.8.1 AC Sources - Operating

LCO 3.8.1 The following AC electrical power sources shall be OPERABLE:

a. Two qualified circuits between the offsite transmission network and the onsite Class 1E AC Electric Power Distribution System,

b. Three diesel generators (DGs), and

[c. Three automatic sequencers.]

APPLICABILITY: MODES 1, 2, and 3.

- NOTE -
[Division 3] AC electrical power sources are not required to be OPERABLE when High Pressure Core Spray System [2C Standby Service Water System] is inoperable.

BWR6 Insert 3

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One [required] offsite circuit inoperable.	A.1	Perform SR 3.8.1.1 for OPERABLE [required] offsite circuit.	1 hour <u>AND</u> Once per 8 hours thereafter
	<u>AND</u>		

BASES

LCO 3.0.3 (continued)

The time limits of LCO 3.0.3 allow 37 hours for the unit to be in MODE 4 when a shutdown is required during MODE 1 operation. If the unit is in a lower MODE of operation when a shutdown is required, the time limit for reaching the next lower MODE applies. If a lower MODE is reached in less time than allowed, however, the total allowable time to reach MODE 4, or other applicable MODE, is not reduced. For example, if MODE 2 is reached in 2 hours, then the time allowed for reaching MODE 3 is the next 11 hours, because the total time for reaching MODE 3 is not reduced from the allowable limit of 13 hours. Therefore, if remedial measures are completed that would permit a return to MODE 1, a penalty is not incurred by having to reach a lower MODE of operation in less than the total time allowed.

In MODES 1, 2, and 3, LCO 3.0.3 provides actions for Conditions not covered in other Specifications. The requirements of LCO 3.0.3 do not apply in MODES 4 and 5 because the unit is already in the most restrictive Condition required by LCO 3.0.3. The requirements of LCO 3.0.3 do not apply in other specified conditions of the Applicability (unless in MODE 1, 2, or 3) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken.

Exceptions to LCO 3.0.3 are provided in instances where requiring a unit shutdown, in accordance with LCO 3.0.3, would not provide appropriate remedial measures for the associated condition of the unit. An example of this is in LCO 3.7.7, "Fuel Pool Water Level." LCO 3.7.7 has an Applicability of "During movement of irradiated fuel assemblies in the associated fuel storage pool." Therefore, this LCO can be applicable in any or all MODES. If the LCO and the Required Actions of LCO 3.7.7 are not met while in MODE 1, 2, or 3, there is no safety benefit to be gained by placing the unit in a shutdown condition. The Required Action of LCO 3.7.7 of "Suspend movement of irradiated fuel assemblies in the associated fuel storage pool(s)" is the appropriate Required Action to complete in lieu of the actions of LCO 3.0.3. These exceptions are addressed in the individual Specifications.

LCO 3.0.4

Insert 3

~~LCO 3.0.4 establishes limitations on changes in MODES or other specified conditions in the Applicability when an LCO is not met. It precludes placing the unit in a MODE or other specified condition stated in that Applicability (e.g., Applicability desired to be entered) when the following exist:~~

~~a. Unit conditions are such that the requirements of the LCO would not be met in the Applicability desired to be entered and~~

BASES

LCO 3.0.4 (continued)

b. Continued noncompliance with the LCO requirements, if the Applicability were entered, would result in the unit being required to exit the Applicability desired to be entered to comply with the Required Actions.

Compliance with Required Actions that permit continued operation of the unit for an unlimited period of time in a MODE or other specified condition provides an acceptable level of safety for continued operation. This is without regard to the status of the unit before or after the MODE change. Therefore, in such cases, entry into a MODE or other specified condition in the Applicability may be made in accordance with the provisions of the Required Actions. The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before entering an associated MODE or other specified condition in the Applicability.

The provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that result from any unit shutdown.

Exceptions to LCO 3.0.4 are stated in the individual Specifications. These exceptions allow entry into MODES or other specified conditions in the Applicability when the associated ACTIONS to be entered do not provide for continued operation for an unlimited period of time. Exceptions may apply to all the ACTIONS or to a specific Required Action of a Specification.

LCO 3.0.4 is only applicable when entering MODE 3 from MODE 4, MODE 2 from MODE 3 or 4, or MODE 1 from MODE 2. Furthermore, LCO 3.0.4 is applicable when entering any other specified condition in the Applicability only while operating in MODE 1, 2, or 3. The requirements of LCO 3.0.4 do not apply in MODES 4 and 5, or in other specified conditions of the Applicability (unless in MODE 1, 2, or 3) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken. **[** In some cases (e.g., ..) these ACTIONS provide a Note that states "While this LCO is not met, entry into a MODE or other specified condition in the Applicability is not permitted, unless required to comply with ACTIONS." This Note is a requirement explicitly precluding entry into a MODE or other specified condition of the Applicability. **]**

BASES

LCO 3.0.4 (continued)

~~Surveillances do not have to be performed on the associated inoperable equipment (or on variables outside the specified limits), as permitted by SR 3.0.1. Therefore, changing MODES or other specified conditions while in an ACTIONS Condition, either in compliance with LCO 3.0.4 or where an exception to LCO 3.0.4 is stated, is not a violation of SR 3.0.1 or SR 3.0.4 for those Surveillances that do not have to be performed due to the associated inoperable equipment. However, SRs must be met to ensure OPERABILITY prior to declaring the associated equipment OPERABLE (or variable within limits) and restoring compliance with the affected LCO.~~

LCO 3.0.5

LCO 3.0.5 establishes the allowance for restoring equipment to service under administrative controls when it has been removed from service or declared inoperable to comply with ACTIONS. The sole purpose of this Specification is to provide an exception to LCO 3.0.2 (e.g., to not comply with the applicable Required Action(s)) to allow the performance of required testing to demonstrate either:

a. The OPERABILITY of the equipment being returned to service or

b. The OPERABILITY of other equipment.

The administrative controls ensure the time the equipment is returned to service in conflict with the requirements of the ACTIONS is limited to the time absolutely necessary to perform the required testing to demonstrate OPERABILITY. This Specification does not provide time to perform any other preventive or corrective maintenance.

An example of demonstrating the OPERABILITY of the equipment being returned to service is reopening a containment isolation valve that has been closed to comply with Required Actions, and must be reopened to perform the required testing.

An example of demonstrating the OPERABILITY of other equipment is taking an inoperable channel or trip system out of the tripped condition to prevent the trip function from occurring during the performance of required testing on another channel in the other trip system. A similar example of demonstrating the OPERABILITY of other equipment is taking an inoperable channel or trip system out of the tripped condition to permit the logic to function and indicate the appropriate response during the performance of required testing on another channel in the same trip system.

BASES

SR 3.0.4

~~SR 3.0.4 establishes the requirement that all applicable SRs must be met before entry into a MODE or other specified condition in the Applicability.~~

~~This Specification ensures that system and component OPERABILITY requirements and variable limits are met before entry into MODES or other specified conditions in the Applicability for which these systems and components ensure safe operation of the unit.~~

~~The provisions of this Specification should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before entering an associated MODE or other specified condition in the Applicability.~~

~~However, in certain circumstances, failing to meet an SR will not result in SR 3.0.4 restricting a MODE change or other specified condition change. When a system, subsystem, division, component, device, or variable is inoperable or outside its specified limits, the associated SR(s) are not required to be performed, per SR 3.0.1, which states that surveillances do not have to be performed on inoperable equipment.~~ When equipment is inoperable, SR 3.0.4 does not apply to the associated SR(s) since the requirement for the SR(s) to be performed is removed. Therefore, failing to perform the Surveillance(s) within the specified Frequency does not result in an SR 3.0.4 restriction to changing MODES or other specified conditions of the Applicability. However, since the LCO is not met in this instance, LCO 3.0.4 will govern any restrictions that may (or may not) apply to MODE or other specified condition changes.

Insert 4

~~The provisions of SR 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that result from any unit shutdown.~~

~~The precise requirements for performance of SRs are specified such that exceptions to SR 3.0.4 are not necessary. The specific time frames and conditions necessary for meeting the SRs are specified in the Frequency, in the Surveillance, or both. This allows performance of Surveillances when the prerequisite condition(s) specified in a Surveillance procedure require entry into the MODE or other specified condition in the Applicability of the associated LCO prior to the performance or completion of a Surveillance. A Surveillance that could not be performed until after entering the LCO Applicability, would have its Frequency specified such that it is not "due" until the specific conditions needed are met. Alternately, the Surveillance may be stated in the form of a Note as not required (to be met or performed) until a particular event, condition, or time has been reached. Further discussion of the specific formats of SRs' annotation is found in Section 1.4, Frequency.~~

BASES

SR 3.0.4 (continued)

~~SR 3.0.4 is only applicable when entering MODE 3 from MODE 4, MODE 2 from MODE 3 or 4, or MODE 1 from MODE 2. Furthermore, SR 3.0.4 is applicable when entering any other specified condition in the Applicability only while operating in MODE 1, 2, or 3. The requirements of SR 3.0.4 do not apply in MODES 4 and 5, or in other specified conditions of the Applicability (unless in MODE 1, 2, or 3) because the ACTIONS of individual Specifications sufficiently define the remedial measures to be taken.~~

REVISION HISTORY

REVISION	TSTF	DESCRIPTION	APPROVED
2.1	TSTF-358, R.6	Missed Surveillance Requirement	10/01/01

BASES

ACTIONS

~~Note 1 has been added to the ACTIONS to exclude the MODE change restriction of LCO 3.0.4. This exception allows entry into the applicable MODE while relying on the Actions even though the Actions may eventually require plant shutdown. This exception is acceptable due to the passive function of the instruments, the operator's ability to diagnose an accident using alternate instruments and methods, and the low probability of an event requiring these instruments.~~

A Note has ~~also~~ been provided to modify the ACTIONS related to PAM instrumentation channels. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable PAM instrumentation channels provide appropriate compensatory measures for separate inoperable functions. As such, a Note has been provided that allows separate Condition entry for each inoperable PAM Function.

<u>A.1</u>

When one or more Functions have one required channel that is inoperable, the required inoperable channel must be restored to OPERABLE status within 30 days. The 30 day Completion Time is based on operating experience and takes into account the remaining OPERABLE channel (or in the case of a Function that has only one required channel, other non-Regulatory Guide 1.97 instrument channels to monitor the Function), the passive nature of the instrument (no critical automatic action is assumed to occur from these instruments), and the low probability of an event requiring PAM instrumentation during this interval.

<u>B.1</u>

If a channel has not been restored to OPERABLE status in 30 days, this Required Action specifies initiation of actions in accordance with Specification 5.6.7, which requires a written report to be submitted to the NRC. This report discusses the results of the root cause evaluation of the inoperability and identifies proposed restorative actions. This Action is appropriate in lieu of a shutdown requirement since alternative Actions are identified before loss of functional capability, and given the likelihood of plant conditions that would require information provided by this instrumentation.

BASES

ACTIONS

~~A Note is included that excludes the MODE change restriction of LCO 3.0.4. This exception allows entry into an applicable MODE while relying on the ACTIONS even though the ACTIONS may eventually require a plant shutdown. This exception is acceptable due to the low probability of an event requiring this system.~~

A Remote Shutdown System Division is inoperable when each function is not accomplished by at least one designated Remote Shutdown System channel that satisfies the OPERABILITY criteria for the channel's Function. These criteria are outlined in the LCO section of the Bases.

A Note ~~2~~ has been provided to modify the ACTIONS related to Remote Shutdown System Functions. Section 1.3, Completion Times, specifies that once a Condition has been entered, subsequent divisions, subsystems, components, or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies that Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable Remote Shutdown System Functions provide appropriate compensatory measures for separate Functions.

As such, a Note has been provided that allows separate Condition entry for each inoperable Remote Shutdown System Function.

A.1

Condition A addresses the situation where one or more required Functions of the Remote Shutdown System is inoperable. This includes the control and transfer switches for any required Function.

The Required Action is to restore the Function (both divisions, if applicable) to OPERABLE status within 30 days. The Completion Time is based on operating experience and the low probability of an event that would require evacuation of the control room.

B.1

If the Required Action and associated Completion Time of Condition A are not met, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours. The allowed Completion Time is reasonable, based on operating experience, to reach the required MODE from full power conditions in an orderly manner and without challenging plant systems.

BASES

LCO (continued)

monitoring systems provide early alarms to the operators so closer examination of other detection systems will be made to determine the extent of any corrective action that may be required. With the leakage detection systems inoperable, monitoring for LEAKAGE in the RCPB is degraded.

APPLICABILITY

In MODES 1, 2, and 3, leakage detection systems are required to be OPERABLE to support LCO 3.4.5. This Applicability is consistent with that for LCO 3.4.5.

ACTIONS

~~The Actions are modified by a Note that states that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when the drywell floor drain sump and required radiation monitors are inoperable. This allowance is provided because other instrumentation is available to monitor RCS LEAKAGE.~~

A.1

With the drywell floor drain sump monitoring system inoperable, no other form of sampling can provide the equivalent information to quantify leakage. However, the drywell atmospheric activity monitor [and the drywell air cooler condensate flow rate monitor] will provide indications of changes in leakage.

With the drywell floor drain sump monitoring system inoperable, but with RCS unidentified and total LEAKAGE being determined every 8 hours (SR 3.4.5.1), operation may continue for 30 days. The 30 day Completion Time of Required Action A.1 is acceptable, based on operating experience, considering the multiple forms of leakage detection that are still available.

B.1 and B.2

With both gaseous and particulate drywell atmospheric monitoring channels inoperable, grab samples of the drywell atmosphere shall be taken and analyzed to provide periodic leakage information. [Provided a sample is obtained and analyzed every 12 hours, the plant may be operated for up to 30 days to allow restoration of at least one of the required monitors.] [Provided a sample is obtained and analyzed every 12 hours, the plant may continue operation since at least one other form of drywell leakage detection (i.e., air cooler condensate flow rate monitor) is available.]

BASES

APPLICABLE SAFETY ANALYSES (continued)

RCS specific activity satisfies Criterion 2 of 10 CFR 50.36(c)(2)(ii).

LCO

The specific iodine activity is limited to ≤ [0.2] μCi/gm DOSE EQUIVALENT I-131. This limit ensures the source term assumed in the safety analysis for the MSLB is not exceeded, so any release of radioactivity to the environment during an MSLB is less than a small fraction of the 10 CFR 100 limits.

APPLICABILITY

In MODE 1, and MODES 2 and 3 with any main steam line not isolated, limits on the primary coolant radioactivity are applicable since there is an escape path for release of radioactive material from the primary coolant to the environment in the event of an MSLB outside of primary containment.

In MODES 2 and 3 with the main steam lines isolated, such limits do not apply since an escape path does not exist. In MODES 4 and 5, no limits are required since the reactor is not pressurized and the potential for leakage is reduced.

ACTIONS

A.1 and A.2

When the reactor coolant specific activity exceeds the LCO DOSE EQUIVALENT I-131 limit, but is ≤ 4.0 μCi/gm, samples must be analyzed for DOSE EQUIVALENT I-131 at least once every 4 hours. In addition, the specific activity must be restored to the LCO limit within 48 hours. The Completion Time of once every 4 hours is based on the time needed to take and analyze a sample. The 48 hour Completion Time to restore the activity level provides a reasonable time for temporary coolant activity increases (iodine spikes or crud bursts) to be cleaned up with the normal processing systems.

Insert 8

~~A note to the Required Action of Condition A excludes the MODE change restriction of LCO 3.0.4. This exception allows entry into the applicable MODE(S) while relying on the ACTIONS even though the ACTIONS may eventually require plant shutdown.~~ This ~~exception~~ allowance is acceptable due to the significant conservatism incorporated into the specific activity limit, the low probability of an event which is limiting due to exceeding this limit, and the ability to restore transient specific activity excursions while the plant remains at, or proceeds to power operation.

BASES

LCO (continued)

Note 1 permits both RHR shutdown cooling subsystems and recirculation pumps to not be in operation for a period of 2 hours in an 8 hour period. Note 2 allows one RHR shutdown cooling subsystem to be inoperable for up to 2 hours for performance of surveillance tests. These tests may be on the affected RHR System or on some other plant system or component that necessitates placing the RHR System in an inoperable status during the performance. This is permitted because the core heat generation can be low enough and the heatup rate slow enough to allow some changes to the RHR subsystems or other operations requiring RHR flow interruption and loss of redundancy.

APPLICABILITY

In MODE 3 with reactor steam dome pressure below the RHR cut in permissive pressure (i.e., the actual pressure at which the interlock resets) the RHR Shutdown Cooling System may be operated in the shutdown cooling mode to remove decay heat to reduce or maintain coolant temperature. Otherwise, a recirculation pump is required to be in operation.

In MODES 1 and 2, and in MODE 3 with reactor steam dome pressure greater than or equal to the RHR cut in permissive pressure, this LCO is not applicable. Operation of the RHR System in the shutdown cooling mode is not allowed above this pressure because the RCS pressure may exceed the design pressure of the shutdown cooling piping. Decay heat removal at reactor pressures greater than or equal to the RHR cut in permissive pressure is typically accomplished by condensing the steam in the main condenser. Additionally, in MODE 2 below this pressure, the OPERABILITY requirements for the Emergency Core Cooling Systems (ECCS) (LCO 3.5.1, "ECCS - Operating") do not allow placing the RHR shutdown cooling subsystem into operation.

The requirements for decay heat removal in MODES 4 and 5 are discussed in LCO 3.4.10, "Residual Heat Removal (RHR) Shutdown Cooling System - Cold Shutdown," LCO 3.9.8, "Residual Heat Removal (RHR) - High Water Level," and LCO 3.9.9, "Residual Heat Removal (RHR) - Low Water Level."

ACTIONS

~~A Note to the ACTIONS excludes the MODE change restriction of LCO 3.0.4. This exception allows entry into the applicable MODE(S) while relying on the ACTIONS even though the ACTIONS may eventually require plant shutdown. This exception is acceptable due to the redundancy of the OPERABLE subsystems, the low pressure at which the plant is operating, the low probability of an event occurring during~~

BASES

ACTIONS (continued)

operation in this condition, and the availability of alternate methods of decay heat removal capability.

A ~~second~~ Note has been provided to modify the ACTIONS related to RHR shutdown cooling subsystems. Section 1.3, Completion Times, specifies once a Condition has been entered, subsequent divisions, subsystems, components or variables expressed in the Condition, discovered to be inoperable or not within limits, will not result in separate entry into the Condition. Section 1.3 also specifies Required Actions of the Condition continue to apply for each additional failure, with Completion Times based on initial entry into the Condition. However, the Required Actions for inoperable shutdown cooling subsystems provide appropriate compensatory measures for separate inoperable shutdown cooling subsystems. As such, a Note has been provided that allows separate Condition entry for each inoperable RHR shutdown cooling subsystem.

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

With one required RHR shutdown cooling subsystem inoperable for decay heat removal, except as permitted by LCO Note 2, the inoperable subsystem must be restored to OPERABLE status without delay. In this condition, the remaining OPERABLE subsystem can provide the necessary decay heat removal. The overall reliability is reduced, however, because a single failure in the OPERABLE subsystem could result in reduced RHR shutdown cooling capability. Therefore an alternate method of decay heat removal must be provided.

With both RHR shutdown cooling subsystems inoperable, an alternate method of decay heat removal must be provided in addition to that provided for the initial RHR shutdown cooling subsystem inoperability. This re-establishes backup decay heat removal capabilities, similar to the requirements of the LCO. The 1 hour Completion Time is based on the decay heat removal function and the probability of a loss of the available decay heat removal capabilities.

The required cooling capacity of the alternate method should be ensured by verifying (by calculation or demonstration) its capability to maintain or reduce temperature. Decay heat removal by ambient losses can be considered as, or contributing to, the alternate method capability. Alternate methods that can be used include (but are not limited to) the Spent Fuel Pool Cooling System or the Reactor Water Cleanup System.

BASES

APPLICABILITY

All ECCS subsystems are required to be OPERABLE during MODES 1, 2, and 3 when there is considerable energy in the reactor core and core cooling would be required to prevent fuel damage in the event of a break in the primary system piping. In MODES 2 and 3, the ADS function is not required when pressure is ≤ 150 psig because the low pressure ECCS subsystems (LPCS and LPCI) are capable of providing flow into the RPV below this pressure. ECCS requirements for MODES 4 and 5 are specified in LCO 3.5.2, "ECCS - Shutdown."

ACTIONS

BWR6 Insert 1B

A.1

If any one low pressure ECCS injection/spray subsystem is inoperable, the inoperable subsystem must be restored to OPERABLE status within 7 days. In this Condition, the remaining OPERABLE subsystems provide adequate core cooling during a LOCA. However, overall ECCS reliability is reduced because a single failure in one of the remaining OPERABLE subsystems concurrent with a LOCA may result in the ECCS not being able to perform its intended safety function. The 7 day Completion Time is based on a reliability study (Ref. 12) that evaluated the impact on ECCS availability by assuming that various components and subsystems were taken out of service. The results were used to calculate the average availability of ECCS equipment needed to mitigate the consequences of a LOCA as a function of allowed outage times (i.e., Completion Times).

B.1 and B.2

If the HPCS System is inoperable, and the RCIC System is verified to be OPERABLE (when RCIC is required to be OPERABLE), the HPCS System must be restored to OPERABLE status within 14 days. In this Condition, adequate core cooling is ensured by the OPERABILITY of the redundant and diverse low pressure ECCS injection/spray subsystems in conjunction with the ADS. Also, the RCIC System will automatically provide makeup water at most reactor operating pressures. Verification of RCIC OPERABILITY immediately is therefore required when HPCS is inoperable. This may be performed by an administrative check, by examining logs or other information to determine if RCIC is out of service for maintenance or other reasons. It is not necessary to perform the Surveillances needed to demonstrate the OPERABILITY of the RCIC System. However, if the OPERABILITY of the RCIC System cannot be verified and RCIC is required to be OPERABLE, Condition D must be immediately entered. If a single active component fails concurrent with a design basis LOCA, there is a potential, depending on the specific failure, that the minimum required ECCS equipment will not be available. A

BASES

APPLICABLE SAFETY ANALYSES	The function of the RCIC System is to respond to transient events by providing makeup coolant to the reactor. The RCIC System is not an Engineered Safety Feature System and no credit is taken in the safety analyses for RCIC System operation. The RCIC System satisfies Criterion 4 of 10 CFR 50.36(c)(2)(ii).
LCO	The OPERABILITY of the RCIC System provides adequate core cooling such that actuation of any of the ECCS subsystems is not required in the event of RPV isolation accompanied by a loss of feedwater flow. The RCIC System has sufficient capacity to maintain RPV inventory during an isolation event.
APPLICABILITY	The RCIC System is required to be OPERABLE in MODE 1, and MODES 2 and 3 with reactor steam dome pressure > 150 psig since RCIC is the primary non-ECCS water source for core cooling when the reactor is isolated and pressurized. In MODES 2 and 3 with reactor steam dome pressure ≤ 150 psig, and in MODES 4 and 5, RCIC is not required to be OPERABLE since the ECCS injection/spray subsystems can provide sufficient flow to the vessel.

ACTIONS

BWR6 Insert 2B

A.1 and A.2

If the RCIC System is inoperable during MODE 1, or MODES 2 or 3 with reactor steam dome pressure > 150 psig, and the HPCS System is verified to be OPERABLE, the RCIC System must be restored to OPERABLE status within 14 days. In this Condition, loss of the RCIC System will not affect the overall plant capability to provide makeup inventory at high RPV pressure since the HPCS System is the only high pressure system assumed to function during a loss of coolant accident (LOCA). OPERABILITY of the HPCS is therefore verified immediately when the RCIC System is inoperable. This may be performed as an administrative check, by examining logs or other information, to determine if the HPCS is out of service for maintenance or other reasons. Verification does not require performing the Surveillances needed to demonstrate the OPERABILITY of the HPCS System. If the OPERABILITY of the HPCS System cannot be verified, however, Condition B must be immediately entered. For transients and certain abnormal events with no LOCA, RCIC (as opposed to HPCS) is the preferred source of makeup coolant because of its relatively small capacity, which allows easier control of RPV water level. Therefore, a limited time is allowed to restore the inoperable RCIC to OPERABLE status.

BASES

APPLICABILITY (continued)

LOCA. Also, because of the limited time in this MODE, the probability of an accident requiring the primary containment hydrogen recombiner is low. Therefore, the primary containment hydrogen recombiner is not required in MODE 3.

In MODES 4 and 5, the probability and consequences of a LOCA are low due to the pressure and temperature limitations in these MODES. Therefore, the primary containment hydrogen recombiner is not required in these MODES.

ACTIONS

A.1

With one primary containment hydrogen recombiner inoperable, the inoperable primary containment hydrogen recombiner must be restored to OPERABLE status within 30 days. In this Condition, the remaining OPERABLE primary containment recombiner is adequate to perform the hydrogen control function. However, the overall reliability is reduced because a single failure in the OPERABLE recombiner could result in reduced hydrogen control capability. The 30 day Completion Time is based on the low probability of the occurrence of a LOCA that would generate hydrogen in amounts capable of exceeding the flammability limit, the amount of time available after the event for operator action to prevent hydrogen accumulation exceeding this limit, and the low probability of failure of the OPERABLE primary containment hydrogen recombiner.

~~Required Action A.1 has been modified by a Note stating that the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when one recombiner is inoperable. This allowance is provided because of the low probability of the occurrence of a LOCA that would generate hydrogen in amounts capable of exceeding the flammability limit, the low probability of the failure of the OPERABLE recombiner, and the amount of time available after a postulated LOCA for operator action to prevent exceeding the flammability limit.~~

B.1 and B.2

- REVIEWER'S NOTE -

This Condition is only allowed for units with an alternate hydrogen control system acceptable to the technical staff.

BASES

APPLICABILITY (continued)

In MODE 3, both the hydrogen production rate and the total hydrogen produced after a degraded core accident would be less than that calculated for the DBA LOCA. Also, because of the limited time in this MODE, the probability of an accident requiring the hydrogen ignitor is low. Therefore, the hydrogen ignitor is not required in MODE 3.

In MODES 4 and 5, the probability and consequences of a degraded core accident are reduced due to the pressure and temperature limitations. Therefore, the hydrogen ignitors are not required to be OPERABLE in MODES 4 and 5 to control hydrogen.

ACTIONS

A.1

With one hydrogen ignitor division inoperable, the inoperable division must be restored to OPERABLE status within 30 days. In this Condition, the remaining OPERABLE hydrogen ignitor division is adequate to perform the hydrogen burn function. However, the overall reliability is reduced because a single failure in the OPERABLE subsystem could result in reduced hydrogen control capability. The 30 day Completion Time is based on the low probability of the occurrence of a degraded core event that would generate hydrogen in amounts equivalent to a metal water reaction of 75% of the core cladding, the amount of time available after the event for operator action to prevent hydrogen accumulation from exceeding the flammability limit, and the low probability of failure of the OPERABLE hydrogen ignitor division.

~~Required Action A.1 has been modified by a Note indicating the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when one hydrogen ignitor division is inoperable or when one or more areas with adjacent ignitors are inoperable. The allowance is provided because of the low probability of the occurrence of an event that would generate hydrogen in amounts capable of exceeding the flammability limit, the low probability of the failure of both hydrogen ignitor divisions or adjacent ignitors, and the amount of time available after the event for operator action to prevent exceeding the flammability limit.~~

B.1 and B.2

With two primary containment and drywell ignitor divisions inoperable, the ability to perform the hydrogen control function via alternate capabilities must be verified by administrative means within 1 hour. The alternate hydrogen control capabilities are provided by one hydrogen recombiner and one drywell purge subsystem. The 1 hour Completion Time allows a

BASES

APPLICABILITY (continued)

an accident requiring the [Drywell Purge System] is low. Therefore, the [Drywell Purge System] is not required in MODE 3.

In MODES 4 and 5, the probability and consequences of a LOCA are reduced due to the pressure and temperature limitations in these MODES. Therefore, the [Drywell Purge System] is not required in these MODES.

ACTIONS

A.1

With one [drywell purge] subsystem inoperable, the inoperable subsystem must be restored to OPERABLE status within 30 days. In this Condition, the remaining OPERABLE subsystem is adequate to perform the drywell purge function. However, the overall reliability is reduced because a single failure in the OPERABLE subsystem could result in reduced drywell purge capability. The 30 day Completion Time is based on the availability of the second subsystem, the low probability of a LOCA that would generate hydrogen in amounts capable of exceeding the flammability limit, and the amount of time available after the event for operator action to prevent hydrogen accumulation from exceeding this limit.

~~Required Action A.1 has been modified by a Note indicating the provisions of LCO 3.0.4 are not applicable. As a result, a MODE change is allowed when one subsystem is inoperable. This allowance is provided because of the low probability of the occurrence of a LOCA that would generate hydrogen in amounts capable of exceeding the flammability limit, the low probability of the failure of the OPERABLE subsystem, and the amount of time available after a postulated LOCA for operator action to prevent exceeding the flammability limit.~~

B.1 and B.2

- REVIEWER'S NOTE -

This Condition is only allowed for units with an alternate hydrogen control system acceptable to the technical staff.

With two [drywell purge] subsystems inoperable, the ability to perform the hydrogen control function via alternate capabilities must be verified by administrative means within 1 hour. The alternate hydrogen control capabilities are provided by [one division of the hydrogen ignitors]. The

BASES

LCO (continued)

The AC sources in one division must be separate and independent (to the extent possible) of the AC sources in the other division(s). For the DGs, the separation and independence are complete. For the offsite AC sources, the separation and independence are to the extent practical.

APPLICABILITY

The AC sources and sequencers are required to be OPERABLE in MODES 1, 2, and 3 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

A Note has been added taking exception to the Applicability requirements for Division 3 sources, provided the HPCS System is declared inoperable. This exception is intended to allow declaring of the Division 3 inoperable either in lieu of declaring the Division 3 source inoperable, or at any time subsequent to entering ACTIONS for an inoperable Division 3 source. This exception is acceptable since, with the Division 3 inoperable and the associated ACTIONS entered, the Division 3 AC sources provide no additional assurance of meeting the above criteria.

AC power requirements for MODES 4 and 5 are covered in LCO 3.8.2, "AC Sources - Shutdown."

ACTIONS

A.1

BWR6
Insert 3B

To ensure a highly reliable power source remains, it is necessary to verify the availability of the remaining required offsite circuits on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in the Required Action not met. However, if a second required circuit fails SR 3.8.1.1, the second offsite circuit is inoperable, and Condition C, for two offsite circuits inoperable, is entered.

A.2

Required Action A.2, which only applies if the division cannot be powered from an offsite source, is intended to provide assurance that an event