NUCLEAR ENERGY INSTITUTE

Anthony R. Pietrangelo
DIRECTOR, RISK AND PERFORMANCE
BASED REGULATION

March 9, 2001

Dr. William D. Beckner, Branch Chief
Technical Specifications Branch
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: Forwarding of TSTFs

PROJECT NUMBER: 689

Dear Dr. Beckner:

Enclosed is technical specification traveler TSTF-359, Revision 5. This traveler modifies technical specification limiting condition for operation (LCO) 3.0.4, which provides limitations on entering the mode of applicability of an LCO. The proposed change would replace the existing specific LCO 3.0.4 exceptions in the standard technical specification NUREGs with a risk-informed basis for exceptions.

This change applies only to LCOs associated with equipment out-of-service, and does not address LCOs pertaining to plant parameters (e.g., fuel limits). Included with the proposed technical specification changes are generic risk evaluations performed by each NSSS Owners Group for their respective NUREGs. These evaluations assessed the risk impact of out-of-service plant systems and equipment described in technical specifications as a function of plant mode, and identified that, except for certain equipment, the plant risk was insensitive to the mode change. For simultaneous use of multiple 3.0.4 exceptions, or for equipment identified by the generic risk evaluations as having a potential risk impact from the mode change, additional plant-specific evaluation would be required. Otherwise, the LCO 3.0.4 mode change restriction would be removed for LCOs pertaining to plant systems and equipment.

Please contact me at (202) 739-8081 or Biff Bradley at (202) 739-8138 if you have any questions or need to meet with industry experts on these recommended changes.

Sincerely,

Anthony R. Pietrangelo

Enclosure

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

Industry/TSTF Standard Technical Specification Change Traveler

Increase Flexibility in MODE Restraints

Classification: 3) Improve Specifications

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

Description:

ITS LCO 3.0.4 is revised 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 performed which justifies the use of LCO 3.0.4 or the ACTIONS to be entered permit continued operation in the MODE or other specified condition in this Applicability for an unlimited period of time. 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 this Applicability for an unlimited period of time. SR 3.0.4 is revised to reflect the change to LCO 3.0.4.

Justification:

See Attached.

Industry Contact:	Clarkson, Noel	(864) 855-3077	ntclarks@duke-energy.com
NRC Contact:	Gilles, Nan	301-415-1180	nvg@nrc.gov

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

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

NRC Comments:
(No Comments)

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 Resolution: Date:

TSTF Revision 3 Revision Status: Closed

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: Active Next Action: TSTF

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

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

TSTF Revision 5 **Revision Status: Active** **Next Action: TSTF**

TSTF Comments:
(No Comments)
TSTF Resolution: Date:

Incorporation Into the NUREGs

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

NUREG Rev Incorporated:

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 3.3.17	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.A	RCS Specific Activity	NUREG(s)- 1430 Only
Action 3.4.16.A 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 3.3.3	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.A	RCS Specific Activity	NUREG(s)- 1431 Only
Action 3.4.16.A 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.A	RCS Specific Activity	NUREG(s)- 1432 Only
Action 3.4.16.A 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 3.3.3.1	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.A	RCS Specific Activity	NUREG(s)- 1433 Only
Action 3.4.7.A 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.A	RCS Specific Activity	NUREG(s)- 1434 Only
Action 3.4.8.A Bases	RCS Specific Activity	NUREG(s)- 1434 Only
Action 3.4.9	RHR and Shutdown Cooling System - Hot Shutdown	NUREG(s)- 1434 Only
Action 3.4.9 Bases	RHR and Shutdown Cooling System - Hot Shutdown	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

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 MODE changes, "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.

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. 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.

Proposed Change

The proposed change revises LCO 3.0.4 and SR 3.0.4 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 or time, or, (b.) After performance of a risk evaluation, consideration of the results, determination of the acceptability of the MODE change, and establishment of risk management actions, if appropriate."

The paragraph in LCO 3.0.4, which describes exceptions, is deleted. Individual LCO 3.0.4 exceptions would be deleted throughout the ITS and replaced with use of the risk evaluation provision being added to LCO 3.0.4 and SR 3.0.4.

The Bases of LCO 3.0.4 are revised as follows to explain the use of the new LCO 3.0.4 flexibility:

> "When an LCO is not met, LCO 3.0.4 also allows changes in MODES or other specified conditions in the Applicability after a risk evaluation. 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. Consideration will 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."
>
> "A pre-assessment or configuration-specific risk analysis is required for determination of acceptable risk for changes in MODES or other specified conditions in the Applicability when an LCO is not met. 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. If the risk of changing MODES is determined to be greater than the acceptable risk, the configuration-specific risk evaluation may be used to determine the risk impact, and the need for risk management actions as appropriate, which may include changing MODES."
>
> "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. This risk evaluation should be a qualitative risk analysis taking into account the impact on initiating event frequency and mitigation capability as a function of plant MODE. From such evaluations, systems/components can be identified whose unavailability results in an equal or greater risk impact in MODES 2-5 for PWRs and MODES 2 – 4 for BWRs than in MODE 1. For these systems/components, it would be generally acceptable to utilize the LCO 3.0.4 exceptions. There is a small subset of systems that have been generically determined to be risk significant and do not typically have the LCO 3.0.4 flexibility allowed. The Bases of each ITS NUREG contain this respective generic Owners Group list."
>
> "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 exception at the same time would be evaluated under the auspices of 10 CFR 50.65.a.4 and consideration of risk management actions discussed in Regulatory Guide 1.182. To apply the LCO 3.0.4.b exception to plant systems/components identified in the

Bases as potentially higher risk for MODE 1 operation, a plant specific justification would be required."

"The LCO 3.0.4 exception typically only applies to systems and components. The values and parameters are typically not addressed by LCO 3.0.4 and the list of the value and parameter exclusions are found in licensee controlled documents."

"Previous flexibility beyond the generic LCO 3.0.4 some plants may have had approved for LCO 3.0.4 exceptions and application may be justified using plant specific justification to be retained along with the generic LCO 3.0.4."

"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)"

The Bases of SR 3.0.4 are also revised to reflect the changes made to the Specifications.

While these Bases changes are being proposed as part of the generic justification of this proposed change, the Bases for each plant will be revised to be plant specific.

Justification

The proposal to allow entry into a MODE or other specified condition in the Applicability while relying on ACTIONS based on a risk evaluation 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 evaluate the risk associated with various plant configurations. This change is a logical step of requiring licensees to evaluate the application of LCO 3.0.4 exceptions in light of the newly available tools and information.

The risk evaluation may consider a variety of factors, but will focus on maintaining acceptable plant risk. Consideration would be given to the probability of completing restoration such that the requirements of the LCO would be met prior to entering ACTIONS that would require exiting the Applicability. The evaluation 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 LCOs, MODES, or Applicability can be entered while relying on the ACTIONS as do the current LCO 3.0.4 exceptions, but would add the requirement to evaluate the risks prior to making the MODE

change. This evaluation is not currently required. In addition, the ITS 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.

The recent revisions to 10CFR50.65 require 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. So effectively, there is be a regulatory requirement to evaluate the risks prior to making the MODE change.

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.

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 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 specified condition in the Applicability. For cases where a potential risk increase can occur, a risk evaluation is required. This will ensure that no MODE changes allowed by this change will result in an unacceptable risk increase. Overall, since most MODE changes allowed by this TSTF result in a risk decrease from one MODE to the next, and a risk evaluation is required for any potential MODE change resulting in a risk increase, this change is considered risk neutral.

This change in LCO 3.0.4 philosophy would require a change in SR 3.0.4. If a Surveillance Requirement is not met prior to entering the MODE or specified condition in the Applicability, the LCO would be declared not met and LCO 3.0.4 would apply.

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 evaluation should be performed to assess the risk impact of the MODE change, based on the specific plant configuration at that time. This risk evaluation should be a qualitative risk analysis taking into account the impact on initiating event frequency and mitigation capability as a function of plant MODE. From such evaluations, systems/components can be identified whose unavailability results in an equal or greater risk impact in MODES 2-5 for PWRs and MODES 2 – 4 for BWRs than in MODE 1. For these systems/components, it would be generally acceptable to utilize the LCO 3.0.4 exceptions. There is a small subset of systems that have been generically determined to be risk significant and do not typically have the LCO 3.0.4 flexibility allowed. The Bases of each ITS NUREG contain this generic Owners Group list.

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 exception at the same time would be evaluated under the auspices of 10 CFR 50.65.a.4 and consideration of risk management actions discussed in Regulatory Guide 1.182. To apply the LCO 3.0.4.b exception to plant systems/components identified in the Bases as potentially higher risk for MODE 1 operation, a plant specific justification would be required.

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 evaluations and assessments along with their respective Owners Groups reports and this TSTF-359 to justify additional flexibility beyond the generic flexibility provided by this TSTF. These Owners Groups assessments are Attachments 1 – 4 of this TSTF-359.

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATIONS

A change is proposed to the Improved Technical Specifications NUREGs 1430 – 1434, LCO 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 evaluation. 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.

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) or a change in the methods governing normal plant operation. 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 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 evaluation which focuses on minimizing risk. In addition, current allowances to utilize the ACTIONS and Completion Times which do not require risk evaluation to minimize risk 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.

LCO / BASES INSERTS

Insert 1 (LCO 3.0.4) (All Owners Groups)

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

b. After performance of a risk evaluation, consideration of the results, determination of the acceptability of the MODE change, and establishment of risk management actions, if appropriate.

Insert 2 (LCO 3.0.4) (All Owners Groups)

When an LCO is not met, entry into a MODE or other specific condition in the Applicability shall only be made:

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

b. After performance of a risk evaluation, consideration of the results, determination of the acceptability of the MODE change, and establishment of risk management actions, if appropriate.

Insert 3 (LCO 3.0.4 Bases) (BWOG)

When an LCO is not met, LCO 3.0.4 also allows changes in MODES or other specified conditions in the Applicability after a risk evaluation. 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. Consideration will 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.

A pre-assessment or configuration-specific risk analysis is required for determination of acceptable risk for changes in MODES or other specified conditions in the Applicability when an LCO is not met. 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. If the risk of changing MODES is determined to be greater than the acceptable risk, the configuration-specific risk evaluation may be used to determine the risk impact, and the need for risk management actions as appropriate, which may include changing MODES.

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. This risk evaluation should be a qualitative risk analysis taking into account the impact on initiating event frequency and mitigation capability as a function of plant MODE. From such evaluations, systems/components can be identified whose unavailability results in an equal or greater risk impact in MODES 2-5 for PWRs and MODES 2 – 4 for BWRs than in MODE 1. For these systems/components, it would be generally acceptable to utilize the LCO 3.0.4 exceptions. There is a small subset of systems that have been generically determined to be risk significant and do not typically have the LCO 3.0.4 flexibility allowed. The Bases of each ITS NUREG contain this respective generic Owners Group list.

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 exception at the same time would be evaluated under the auspices of 10 CFR 50.65.a.4 and consideration of risk management actions discussed in Regulatory Guide 1.182. To apply the LCO 3.0.4.b exception to plant systems/components identified in the Bases as potentially higher risk for MODE 1 operation, a plant specific justification would be required.

The LCO 3.0.4 exception typically only applies to systems and components. The values and parameters are typically not addressed by LCO 3.0.4 and the list of the value and parameter exclusions are found in licensee controlled documents.

Previous flexibility beyond the generic LCO 3.0.4 some plants may have had approved for LCO 3.0.4 exceptions and application may be justified using plant specific justification to be retained along with the generic LCO 3.0.4.

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
EDG (Hydro-electric units for Oconee)	2, 3, 4, 5
LPI	4, 5
EFW	2, 3, 4

Insert 3 (LCO 3.0.4 Bases) (WOG)

When an LCO is not met, LCO 3.0.4 also allows changes in MODES or other specified conditions in the Applicability after a risk evaluation. 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. Consideration will 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.

A pre-assessment or configuration-specific risk analysis is required for determination of acceptable risk for changes in MODES or other specified conditions in the Applicability when an LCO is not met. 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. If the risk of changing MODES is determined to be greater than the acceptable risk, the configuration-specific risk evaluation may be used to determine the risk impact, and the need for risk management actions as appropriate, which may include changing MODES.

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. This risk evaluation should be a qualitative risk analysis taking into account the impact on initiating event frequency and mitigation capability as a function of plant MODE. From such evaluations, systems/components can be identified whose unavailability results in an equal or greater risk impact in MODES 2-5 for PWRs and MODES 2 – 4 for BWRs than in MODE 1. For these systems/components, it would be generally acceptable to utilize the LCO 3.0.4 exceptions. There is a small subset of systems that have been generically determined to be risk significant and do not typically have the LCO 3.0.4 flexibility allowed. The Bases of each ITS NUREG contain this respective generic Owners Group list.

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 exception at the same time would be evaluated under the auspices of 10 CFR 50.65.a.4 and consideration of risk management actions discussed in Regulatory Guide 1.182. To apply the LCO 3.0.4.b exception to plant systems/components identified in the Bases as potentially higher risk for MODE 1 operation, a plant specific justification would be required.

The LCO 3.0.4 exception typically only applies to systems and components. The values and parameters are typically not addressed by LCO 3.0.4 and the list of the value and parameter exclusions are found in licensee controlled documents.

Previous flexibility beyond the generic LCO 3.0.4 some plants may have had approved for LCO 3.0.4 exceptions and application may be justified using plant specific justification to be retained along with the generic LCO 3.0.4.

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
ESFAS Instrumentation (Function 6, Auxiliary Feedwater)	1, 2, 3, 4
RCS Loops	5
LTOP System	4, 5, 6
ECCS Shutdown (ECCS High Head Subsystem)	4
ADVS	1, 2, 3, 4
AFW System	1, 2, 3, 4
AC Sources (Diesel Generators)	1, 2, 3, 4, 5, 6

Insert 3 (LCO 3.0.4 Bases) (CEOG)

When an LCO is not met, LCO 3.0.4 also allows changes in MODES or other specified conditions in the Applicability after a risk evaluation. 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. Consideration will 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.

A pre-assessment or configuration-specific risk analysis is required for determination of acceptable risk for changes in MODES or other specified conditions in the Applicability when an LCO is not met. 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. If the risk of changing MODES is determined to be greater than the acceptable risk, the configuration-specific risk evaluation may be used to determine the risk impact, and the need for risk management actions as appropriate, which may include changing MODES.

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. This risk evaluation should be a qualitative risk analysis taking into account the impact on initiating event frequency and mitigation capability as a function of plant MODE. From such evaluations, systems/components can be identified whose unavailability results in an equal or greater risk impact in MODES 2-5 for PWRs and MODES 2 – 4 for BWRs than in MODE 1. For these systems/components, it would be generally acceptable to utilize the LCO 3.0.4 exceptions. There is a small subset of systems that have been generically determined to be risk significant and do not typically have the LCO 3.0.4 flexibility allowed. The Bases of each ITS NUREG contain this respective generic Owners Group list.

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 exception at the same time would be evaluated under the auspices of 10 CFR 50.65.a.4 and consideration of risk management actions discussed in Regulatory Guide 1.182. To apply the LCO 3.0.4.b exception to plant systems/components identified in the Bases as potentially higher risk for MODE 1 operation, a plant specific justification would be required.

The LCO 3.0.4 exception typically only applies to systems and components. The values and parameters are typically not addressed by LCO 3.0.4 and the list of the value and parameter exclusions are found in licensee controlled documents.

Previous flexibility beyond the generic LCO 3.0.4 some plants may have had approved for LCO 3.0.4 exceptions and application may be justified using plant specific justification to be retained along with the generic LCO 3.0.4.

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
AFW and AC / DC Power Supporting AFW	2, 3
Emergency Diesels supporting AFW	4
Emergency Diesels	3
Turbine Driven AFW Pump	3

Insert 3 (LCO 3.0.4 Bases) (BWR/4)

When an LCO is not met, LCO 3.0.4 also allows changes in MODES or other specified conditions in the Applicability after a risk evaluation. 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. Consideration will 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.

A pre-assessment or configuration-specific risk analysis is required for determination of acceptable risk for changes in MODES or other specified conditions in the Applicability when an LCO is not met. 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. If the risk of changing MODES is determined to be greater than the acceptable risk, the configuration-specific risk evaluation may be used to determine the risk impact, and the need for risk management actions as appropriate, which may include changing MODES.

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. This risk evaluation should be a qualitative risk analysis taking into account the impact on initiating event frequency and mitigation capability as a function of plant MODE. From such evaluations, systems/components can be identified whose unavailability results in an equal or greater risk impact in MODES 2-5 for PWRs and MODES 2 – 4 for BWRs than in MODE 1. For these systems/components, it would be generally acceptable to utilize the LCO 3.0.4 exceptions. There is a small subset of systems that have been generically determined to be risk significant and do not typically have the LCO 3.0.4 flexibility allowed. The Bases of each ITS NUREG contain this respective generic Owners Group list.

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 exception at the same time would be evaluated under the auspices of 10 CFR 50.65.a.4 and consideration of risk management actions discussed in Regulatory Guide 1.182. To apply the LCO 3.0.4.b exception to plant systems/components identified in the Bases as potentially higher risk for MODE 1 operation, a plant specific justification would be required.

The LCO 3.0.4 exception typically only applies to systems and components. The values and parameters are typically not addressed by LCO 3.0.4 and the list of the value and parameter exclusions are found in licensee controlled documents.

Previous flexibility beyond the generic LCO 3.0.4 some plants may have had approved for LCO 3.0.4 exceptions and application may be justified using plant specific justification to be retained along with the generic LCO 3.0.4.

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
Reactor Protection System (RPS)	1, 2
High Pressure Coolant Injection (HPCI) System (BWR 3 and 4 plants)	1, 2
Reactor Core Isolation Cooling (RCIC) System (BWR 3 and 4 plants)	1, 2
Isolation Condenser (BWR 2 plants)	1, 2
Emergency / Shutdown AC Power	1, 2, 3, 4
Diesel Generators	1, 2, 3, 4
Hardened Wetwell Vent System	1, 2, 3, 4
Vital DC Bus Power	1, 2, 3, 4
Service Water System	1, 2, 3, 4
Residual Heat Removal System	4

Insert 3 (LCO 3.0.4 Bases) (BWR/6)

When an LCO is not met, LCO 3.0.4 also allows changes in MODES or other specified conditions in the Applicability after a risk evaluation. 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. Consideration will 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.

A pre-assessment or configuration-specific risk analysis is required for determination of acceptable risk for changes in MODES or other specified conditions in the Applicability when an LCO is not met. 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. If the risk of changing MODES is determined to be greater than the acceptable risk, the configuration-specific risk evaluation may be used to determine the risk impact, and the need for risk management actions as appropriate, which may include changing MODES.

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. This risk evaluation should be a qualitative risk analysis taking into account the impact on initiating event frequency and mitigation capability as a function of plant MODE. From such evaluations, systems/components can be identified whose unavailability results in an equal or greater risk impact in MODES 2-5 for PWRs and MODES 2 – 4 for BWRs than in MODE 1. For these systems/components, it would be generally acceptable to utilize the LCO 3.0.4 exceptions. There is a small subset of systems that have been generically determined to be risk significant and do not typically have the LCO 3.0.4 flexibility allowed. The Bases of each ITS NUREG contain this respective generic Owners Group list.

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 exception at the same time would be evaluated under the auspices of 10 CFR 50.65.a.4 and consideration of risk management actions discussed in Regulatory Guide 1.182. To apply the LCO 3.0.4.b exception to plant systems/components identified in the Bases as potentially higher risk for MODE 1 operation, a plant specific justification would be required.

The LCO 3.0.4 exception typically only applies to systems and components. The values and parameters are typically not addressed by LCO 3.0.4 and the list of the value and parameter exclusions are found in licensee controlled documents.

Previous flexibility beyond the generic LCO 3.0.4 some plants may have had approved for LCO 3.0.4 exceptions and application may be justified using plant specific justification to be retained along with the generic LCO 3.0.4.

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
Reactor Protection System (RPS)	1, 2
High Pressure Core Spray (HPCS) (BWR 5 and 6 plants)	1, 2
Reactor Core Isolation Cooling (RCIC) System (BWR 5 and 6 plants)	1, 2
Emergency / Shutdown AC Power	1, 2, 3, 4
Diesel Generators	1, 2, 3, 4
Hardened Wetwell Vent System	1, 2, 3, 4
Vital DC Bus Power	1, 2, 3, 4
Service Water System	1, 2, 3, 4
Residual Heat Removal System	4

Insert 4 (SR 3.0.4 Bases) (All Owners Groups)

A provision is included to allow entry into a MODE or other specified condition in the Applicability:

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

b. After performance of a risk evaluation, consideration of the results, determination of the acceptability of the MODE change, and establishment of risk management actions, if appropriate.]

ATTACHMENT 1
BWR
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

The only undertakings of General Electric Company (GE) respecting information in this document are contained in the contract between the Boiling Water Reactors Owners' Group (BWROG) and GE, as identified in the respective utilities' BWROG Standing Purchase Order for the performance of the work described herein, and nothing in this document shall be construed as changing those individual contracts. The use of this information, except as defined by said contracts, or for any purpose other than that for which it is intended, is not authorized, and with respect to any other unauthorized use, neither GE, nor any of the contributors to this document makes any representation or warranty, and assumes no liability as to the completeness, accuracy, or usefulness of the information contained in this document.

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

BAW-2383

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

November 27, 2000

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" or "less" important relative to their required operability prior to changing modes when returning to power.

2.0 BACKGROUND

Initiative 3 of the industry's Risk-Informed Technical Specification (RITS) Program addresses a global change to the 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 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 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

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 (as delineated in STS for Babcock & Wilcox (B&W) plants (Reference 2)). 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.

Consistent with the Increase Flexibility in MODE Restraints Traveler, the following mode changes are considered:

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

The change from Mode 6 to 5 is not included since the STS action statements do not specify Mode 6 as an end state. Although not specifically addressed in the Traveler, some information for the Mode 6 to 5 transition is provided in this evaluation. This is intended to provide continuity into, and establish, Mode 5 initial conditions.

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.

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 (Mode 5 and lower end of Mode 4)
- 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 ensure 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
- Remove shutdown bypass from all RPS channels (leads to 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, i.e., 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 (i.e., startup following an extended outage with EFW and ADVs fully operable or available). 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 lower end of Mode 4 when RCS cooling is transitioned from the SGs to the DHR system.

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 switch between SG cooling and DHR system cooling
- Mode 5: Mis-alignment issues related to DHR 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 loss of inventory events (mis-alignment issue) in Mode 4 and 5 has been seen to be a significant contributor to plant risk. The frequency of a mis-alignment in Mode 5 is expected to be lower than in Mode 4 since DHR cooling is already established in Mode 5 and, therefore, such valve alignments have already been successfully completed.

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 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.

Transients Leading to Inadequate Primary-to-Secondary Heat Transfer (P-S HT): 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.

Loss of Decay Heat Removal: Loss of decay heat removal is applicable to Modes 2 through 5. 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. In Mode 4, 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. There are no STS required systems that mitigate DHR system function loss in this situation. Prevention of these events is directly and rigorously addressed via procedures and administrative oversight.

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, 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.

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. 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 $\leq$ [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.

[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 6×10^{-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.

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.

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. As previously noted, only modes starting with Mode 5 are included.

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 LTOP. 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). Relevant to the loss of inventory event (due to valve mis-alignments), it has been shown to contribute significantly to shutdown risk.

There are no STS delineated systems required to be operable for a mode change that mitigates DHR losses induced by the postulated mechanisms. Should such a loss of DHR occur, it is mitigated by operator action using an available LPI train (other systems and equipment will also be available on a plant specific basis) in accordance with approved procedures (STS chapter 5). Should RCS inventory loss occur, it is important that an LPI train be available for its mitigation via operator action, thus reducing the risk associated with this event. The frequency of these

events can be reduced (or prevented) by rigorous adherence to procedural and administrative guidance (STS chapter 5).

Other than these areas of concern, there are no significant perturbations that lead to increased event frequencies when returning to power from Mode 5. 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 automatic overpressure device (PORV) fails. 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.

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, LTOP and secondary side breaks. The key activities in Mode 4 involve increasing RCS temperature and preventing RCS inventory loss due to inadvertent draindown (RCS/DHR valve realignments are likely still being made and mis-alignment can occur). 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 LPI system is available to supply coolant for inventory control via operator actions. When plant shutdown decay heat levels are high, e.g., at the beginning of a shutdown, it is important for EFW to be available.

Mode 3

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. When plant shutdown decay heat levels are high, e.g., at the beginning of a shutdown, it is important for EFW to be available.

Mode 2

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. When plant shutdown decay heat levels are high, e.g., at the beginning of a shutdown, it is important for EFW to be available.

Mode 1

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.

Modes 5-2 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)[2] 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 extended 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" or "less" 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.

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

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. While its focus is on such systems, it also includes discussion of some systems not specifically delineated by STS as being required for mode changes. This was done for completeness and to provide a measure of closure to this issue. 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 being either "more" or "less" important during Modes 5, 4, 3, and 2 than during at-power operations, i.e., Mode 1.

The assessment provided the following results relative to those systems deemed "more" important:

- While in Mode 5:

  One LPI train is aligned to DHR and another is available via operator action. LPI is not delineated by STS as required to be operable to transition from Mode 6 to Mode 5. However, as discussed in section 3.4, the LPI system is important in Mode 5 for loss of DHR backup and RCS draindown mitigation. Hence, LPI is listed as a more important system and treated as a backup system to the DHR system.

  One EDG [hydro-electric units for Oconee] is required by STS to be operable in Mode 5 during movement of irradiated fuel assemblies.

- Prior to entering Mode 4, one LPI train, two EDGs [hydro-electric units for Oconee] and the EFW system are required to be operable.

- Prior to entering Mode 3, two EDGs [hydro-electric units for Oconee] and the EFW system are required to be operable.

- Prior to entering Mode 2, two EDGs [hydro-electric units for Oconee] and the EFW system are required to be operable.

It is these systems deemed "more" important that represent limitations on plant mode changes during startup following a plant shutdown.. Table 4 provides the overall results of the assessment, including those systems deemed to be "less" important during Modes 5, 4, 3, and 2 than during at-power operations, i.e., Mode 1.

5.0 REFERENCES

1. Industry/TSTF Standard Technical Specification Change Traveler, "Increased Flexibility in MODE Restraints," TSTF-359, Rev. 4.

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

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	In service or in 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 placed in standby	Out of service or placed in 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 Systems "More" or "Less" Important Assessment

Mode	Discussion Of Events	Systems More Important	Systems Less Important
5	The events of concern in Mode 5 are loss of DHR and RCS inventory loss. There are no STS delineated systems that mitigate loss of the DHR system function due to the postulated mechanisms (see Mode 5 discussion of section 3.4). Its mitigation requires operator action using available equipment in accordance with approved procedures. Should RCS inventory loss occur, it is important that the LPI train be available for its mitigation via operator action. During Mode 5, STS delineates that LTOP measures be implemented. For B&W plants, as indicated by Reference 3 (see also discussion of Footnote 1 on page 6), it has been determined that the frequency for LTOP events is sufficiently small as to be excluded from concern. This assessment agrees with this determination. Due to the increased frequency of switchyard activities in this mode, it is important to maintain EDG [hydro-electric units for Oconee] availability.	LPI EDG [hydro-electric units for Oconee]	LTOP EFW RBS
4	The key event in this mode is loss of RCS inventory. Should this event occur, it is important that the LPI system be available for its mitigation via operator action in accordance with approved procedures. During Mode 4, until RCS T_{cold} is > [plant specific temperature], LTOP measures are delineated by STS (see Mode 5 discussion in this table). Due to the increased frequency of switchyard activities in this mode, it is important to maintain EDG [hydro-electric units for Oconee] availability.	LPI EFW[1] EDG [hydro-electric units for Oconee]	LTOP HPI RBS
3	All initiating event frequencies for the potential events are approximately equal to or less than when at-power. Decay heat levels are very low providing extended operator mitigation response times using available systems rather than the need for STS delineated system operability. Due to the increased frequency of switchyard activities in this mode, it is important to maintain EDG [hydro-electric units for Oconee] availability.	EFW[1] EDG [hydro-electric units for Oconee]	MSLI MFWI LPI HPI CF RBS

Table 4
Results of Systems "More" or "Less" Important Assessment

Mode	Discussion Of Events	Systems More Important	Systems Less Important
2	All initiating event frequencies for the potential events are approximately equal to or less than those associated with at-power conditions. Reactor power may approach 5%. Due to the low decay heat level, operator mitigation response times for use with available equipment are greatly extended beyond those associated with at-power conditions.	EFW[1] EDG [hydro-electric units for Oconee]	

Notes:

1 EFW on a system basis is judged to be equally as important during shutdown operations in Modes 4, 3, and 2 as during Mode 1 operations. However, functionally EFW is deemed to be less important in Modes 4, 3, and 2 than during Mode 1 operations when basing the assessment on a return to power operations following an extended shutdown, e.g., a refueling outage. For such situations, decay heat levels will be near the minimum expected during the cycle.

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

Mode	Discussion Of Events	Systems More Important
5	The events of concern in Mode 5 are loss of DHR and RCS inventory loss. There are no STS delineated systems that mitigate loss of the DHR system function due to the postulated mechanisms (see Mode 5 discussion of section 3.4). Its mitigation requires operator action using available equipment in accordance with approved procedures. Should RCS inventory loss occur, it is important that the LPI train be available for its mitigation via operator action. During Mode 5, STS delineates that LTOP measures be implemented. For B&W plants, as indicated by Reference 3 (see also discussion of Footnote 1 on page 6), it has been determined that the frequency for LTOP events is sufficiently small as to be excluded from concern. This assessment agrees with this determination. Due to the increased frequency of switchyard activities in this mode, it is important to maintain EDG [hydro-electric units for Oconee] availability.	LPI EDG [hydro-electric units for Oconee]
4	The key event in this mode is loss of RCS inventory. Should this event occur, it is important that the LPI system be available for its mitigation via operator action in accordance with approved procedures. During Mode 4, until RCS T_{cold} is > [plant specific temperature], LTOP measures are delineated by STS (see Mode 5 discussion in this table). Due to the increased frequency of switchyard activities in this mode, it is important to maintain EDG [hydro-electric units for Oconee] availability.	LPI EFW[1] EDG [hydro-electric units for Oconee]
3	All initiating event frequencies for the potential events are approximately equal to or less than when at-power. Decay heat levels are very low providing extended operator mitigation response times using available systems rather than the need for STS delineated system operability. Due to the increased frequency of switchyard activities in this mode, it is important to maintain EDG [hydro-electric units for Oconee] availability.	EFW[1] EDG [hydro-electric units for Oconee]

Table 4A Results of B&WOG Systems "More" Important Assessment		
Mode	**Discussion Of Events**	**Systems More Important**
2	All initiating event frequencies for the potential events are approximately equal to or less than those associated with at-power conditions. Reactor power may approach 5%. Due to the low decay heat level, operator mitigation response times for use with available equipment are greatly extended beyond those associated with at-power conditions.	EFW[1] EDG [hydro-electric units for Oconee]

Notes:

1. EFW on a system basis is judged to be equally as important during shutdown operations in Modes 4, 3, and 2 as during Mode 1 operations. However, functionally EFW is deemed to be less important in Modes 4, 3, and 2 than during Mode 1 operations when basing the assessment on a return to power operations following an extended shutdown, e.g., a refueling outage. For such situations, decay heat levels will be near the minimum expected during the cycle.

Table 4B Results of B&WOG Systems "More" Important Assessment	
Mode	**Systems More Important**
5	LPI EDG [hydro-electric units for Oconee]
4	LPI EFW[1] EDG [hydro-electric units for Oconee]
3	EFW[1] EDG [hydro-electric units for Oconee]
2	EFW[1] EDG [hydro-electric units for Oconee]

Notes:

1. EFW on a system basis is judged to be equally as important during shutdown operations in Modes 4, 3, and 2 as during Mode 1 operations. However, functionally EFW is deemed to be less important in Modes 4, 3, and 2 than during Mode 1 operations when basing the assessment on a return to power operations following an extended shutdown, e.g., a refueling outage. For such situations, decay heat levels will be near the minimum expected during the cycle.

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

LEGAL NOTICE

This report was prepared as an account of work sponsored by the CE Owners Group and CE Nuclear Power LLC. Neither the CEOG nor CENP LLC, nor any person acting on their behalf:

A. Makes any warranty or representation, express or implied including the warranties of fitness for a particular purpose or merchantability, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of, any information, apparatus, method, or process disclosed in this report.

CE NPSD-1207, Rev 0

Qualitative Risk Assessment for Relaxation of Mode Entry Restraints

CEOG Task 1181
Final Report

January 2001

Author: Raymond E Schneider
Raymond Schneider
Probabilistic Safety Analysis

Reviewer: Joseph Congdon
Joseph Congdon
Plant Systems

Approved: RC Whipple
Richard Whipple
Probabilistic Safety Analysis

COPYRIGHT NOTICE

© 2001 CE Nuclear Power LLC
P.O. Box 500
Windsor, Connecticut 06095-0500

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).

3.1 RCS Parameters and Status of Key Systems

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.

RCP Seal LOCAs (loss of seal cooling, System 80 only): 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

General Transients: 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.

Loss of Decay Heat Removal: 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.

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, 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 all heat removal mechanisms require electrical power.

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 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.

Mode 2 Operation

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.

Mode 1 Operation

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.

CE Nuclear Power LLC
2000 Day Hill Road
Windsor, Connecticut 06095-0500

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

LTR-RRA-00-90

QUALITATIVE RISK ASSESSMENT SUPPORTING INCREASED FLEXIBILITY IN MODE RESTRAINTS

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

November 2000

G.R. André
J.D. Andrachek

Westinghouse Electric Company LLC
Nuclear Service Business Unit
P.O. Box 355
Pittsburgh, PA 15230-0355

TABLE OF CONTENTS

LIST OF TABLES

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°F to ~185°F (transition to Mode 5 occurs when RCS temperature exceeds 140°F, per the Improved Tech Specs transition to Mode 5 occurs when the RCS temperature is >200°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°F to ~330°F (transition to Mode 4 occurs when RCS temperature exceeds 200°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°F to ~557°F (transition to Mode 3 occurs when RCS temperature exceeds 350°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.

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 with a corresponding secondary side steam relief system (PORVs or atmospheric steam dump valves) 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 with a corresponding secondary side steam relief system (PORVs or atmospheric steam dump valves) is required to be available. This includes associated support systems and actuation signals to start AFW. 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 with a corresponding secondary side steam relief system (PORVs or atmospheric steam dump valves) is required to be available. This includes associated support systems and actuation signals to start AFW. 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 with a corresponding secondary side steam relief system (PORVs or atmospheric steam dump valves) is required to be available. This includes the associated support systems and actuation signals to start the AFW system.

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.

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) with a corresponding secondary side steam relief system (PORVs or atmospheric steam dump valves) • 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) with a corresponding secondary side steam relief system (PORVs or atmospheric steam dump valves) • Actuation signals to start AFW (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) with a corresponding secondary side steam relief system (PORVs or atmospheric steam dump valves) • Actuation signals to start AFW (only if dependent on AFW for startup) • EDGs available • The systems supporting the operation of the above systems
1	• AFW system available with a corresponding secondary side steam relief system (PORVs or atmospheric steam dump valves) • Actuation signals to start AFW • EDGs available • The systems supporting the operation of the above systems

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.

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 When an LCO is not met, entry into a MODE (only) 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

Insert 1 →

(continued)

3.0 LCO APPLICABILITY

LCO 3.0.4 (continued) 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. These exceptions allow entry into MODES or other specified conditions in the Applicability when the associated ACTIONS to be entered allow unit operation in the MODE or other specified condition in the Applicability only for a limited period of time.

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: 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.

(continued)

3.0 SR APPLICABILITY

SR 3.0.3 (continued) 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 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.

Insert 2

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.

TSTF-359, Rev. 5

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

----------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 5.6.8	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

(continued)

TSTF-359, Rev 5

3.3 INSTRUMENTATION

3.3.18 Remote Shutdown System

LCO 3.3.18 The Remote Shutdown System Functions in Table 3.3.18-1 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 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

TSTF-359, Rev 5

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Required containment sump monitor inoperable.	~~----------NOTE----------~~ ~~LCO 3.0.4 is not applicable.~~ ~~----------~~	
	A.1 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.	~~----------NOTE----------~~ ~~LCO 3.0.4 is not applicable.~~ ~~----------~~	
	B.1.1 Analyze grab samples of the containment atmosphere.	Once per 24 hours
	OR	
		(continued)

TSTF-359, Rev 5

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. ----------	
	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

(continued)

TSTF-359, Rev 5

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

TSTF-359, Rev. 5

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 one AVV [line] to OPERABLE status.	24 hours]
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3. AND C.2 Be in MODE 4 without reliance upon steam generator for heat removal.	6 hours 18 hours

BASES

LCO 3.0.3 (continued)

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

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

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.

Insert 3

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

(continued)

BASES

LCO 3.0.4 (continued)

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. 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 or 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.]

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

(continued)

SR 3.0.4 (continued)

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 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

(continued)

BASES

LCO

15. Emergency Feedwater Flow (continued)

delivering the correct flow to each SG. However, the primary indication used by the operator to ensure an adequate inventory is SG level.

RCS pressure is used by the operator to monitor the cooldown of the RCS following an SG tube rupture or small break LOCA. In addition, HPI flow is throttled based on RCS pressure and subcooled margin. The indication is also used to identify an LPI pump operating at system pressures above its shutoff head. If this condition exists, the operator is instructed to verify this condition exists, to verify HPI flow, and to terminate LPI flow prior to exceeding 30 minutes of LPI pump operation against a deadhead pressure. RCS pressure, in 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 ~~Two~~ is added to the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each

(continued)

TSTF-359, Rev. 5

BASES

LCO (continued)

The Remote Shutdown System instruments and control circuits covered by this LCO do not need to be energized to be considered OPERABLE. This LCO is intended to ensure the Remote Shutdown System instruments and control circuits will be OPERABLE if unit conditions require that the Remote Shutdown System be placed in operation.

APPLICABILITY

The Remote Shutdown System LCO is applicable in MODES 1, 2, and 3. This is required so that the unit can be placed and maintained in MODE 3 for an extended period of time from a location other than the control room.

This LCO is not applicable in MODE 4, 5, or 6. In these MODES, the unit is already subcritical and is in a condition of reduced RCS energy. Under these conditions, considerable time is available to restore necessary 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.

(1) 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 listed in Table 3.3.18-1. 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 any Function listed in Table 3.3.18-1 and the control and transfer switches.

(continued)

TSTF-359, Rev. 5

BASES

ACTIONS

A.1 and A.2 (continued)

acceptable considering the frequency and adequacy of the RCS water inventory balance required by Required Action A.1.

Required Action A.1 and Required Action A.2 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 monitor is inoperable. This allowance is provided because other instrumentation is available to monitor RCS LEAKAGE.

B.1.1, B.1.2, and B.2

With required gaseous or particulate containment atmosphere radioactivity monitoring instrumentation channels inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed or water inventory balances, in accordance with SR 3.4.13.1, must be performed to provide alternate periodic information. With a sample obtained and analyzed or a water inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of at least one of the radioactivity monitors.

The 24 hour interval provides periodic information that is adequate to detect leakage. The 30 day Completion Time recognizes at least one other form of leak detection is available.

Required Actions B.1.1, B.1.2, and B.2 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 containment atmosphere radioactivity monitor is inoperable. This allowance is provided because other instrumentation is available to monitor RCS LEAKAGE.

C.1 and C.2

If a Required Action of Condition A or B 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 5 within 36 hours. The allowed Completion Times are reasonable, based on operating

(continued)

TSTF-359, Rev 5

BASES

LCO (continued)

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 $\geq$ 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 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 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 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.

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.

(continued)

BASES

APPLICABILITY (continued)

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. Therefore, hydrogen recombiners are not required in these MODES.

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.]

(continued)

TSTF-359, Rev 5

BASES (continued)

APPLICABILITY In MODES 1, 2, and 3, and in MODE 4, when steam generator is being relied upon for heat removal, the AVVs 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 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 18 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.

(continued)

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.

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 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

Insert 1

(continued)

TSTF-359, Rev. 5

3.0 LCO APPLICABILITY

LCO 3.0.4 (continued) 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. These exceptions allow entry into MODES or other specified conditions in the Applicability when the associated ACTIONS to be entered allow unit operation in the MODE or other specified condition in the Applicability only for a limited period of time.

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.

Reviewers'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.

(continued)

TSTF-359, Rev. 5

3.0 SR APPLICABILITY

SR 3.0.3 (continued) 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 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.

Insert 2

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.

TSTF-359, Rev. 5

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

----------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 5.6.8.	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

(continued)

TSTF-359, Rev 5

3.3 INSTRUMENTATION

3.3.4 Remote Shutdown System

LCO 3.3.4 The Remote Shutdown System Functions in Table 3.3.4-1 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 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

TSTF-359, Rev. 5

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.

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
	AND		
	B.2	Remove power from associated block valve[s].	1 hour
	AND		
	B.3	Restore PORV[s] to OPERABLE status.	72 hours

(continued)

TSTF-359, Rev 5

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

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Required containment sump monitor inoperable.	----------NOTE---------- LCO 3.0.4 is not applicable. ----------		
	A.1	Perform SR 3.4.13.1.	Once per 24 hours
	AND		
	A.2	Restore required containment sump monitor to OPERABLE status.	30 days

(continued)

TSTF-359, Rev 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required containment atmosphere radioactivity monitor inoperable.	~~----------NOTE---------- LCO 3.0.4 is not applicable. ----------~~	
	B.1.1 Analyze grab samples of the containment atmosphere.	Once per 24 hours
	OR	
	B.1.2 Perform SR 3.4.13.1.	Once per 24 hours
	AND	
	B.2.1 Restore required containment atmosphere radioactivity monitor to OPERABLE status.	30 days
	OR	
	B.2.2 Verify containment air cooler condensate flow rate monitor is OPERABLE.	30 days
C. Required containment air cooler condensate flow rate monitor inoperable.	C.1 Perform SR 3.4.15.1.	Once per 8 hours
	OR	
	C.2 Perform SR 3.4.13.1.	Once per 24 hours

(continued)

TSTF-359, Rev 5

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. ----------	Once per 4 hours
	A.1 Verify DOSE EQUIVALENT I-131 within the acceptable region of Figure 3.4.16-1.	48 hours
	AND	
	A.2 Restore DOSE EQUIVALENT I-131 to within limit.	
B. Gross specific activity of the reactor coolant not within limit.	B.1 Perform SR 3.4.16.2.	4 hours
	AND	
	B.2 Be in MODE 3 with T_{avg} < 500°F.	6 hours

(continued)

TSTF-359, Rev 5

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 AND Once per 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

TSTF-359, Rev 5

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 AND Once per 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

TSTF-359 Rev 5

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 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.	[18] hours

TSTF-359, Rev 5.

BASES

LCO 3.0.3 (continued)

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

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

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.

Insert 3

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

(continued)

LCO 3.0.4 (continued)

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. 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.]

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

(continued)

TSTF-359, Rev 5

BASES

SR 3.0.4 (continued)

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,

(continued)

BASES

LCO

19. Auxiliary Feedwater Flow (continued)

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.

(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.

(continued)

TSTF-359, Rev. 5

BASES

LCO (continued)

as one channel of any of the alternate information or control sources is OPERABLE.

The remote shutdown instrument and control circuits covered by this LCO do not need to be energized to be considered OPERABLE. This LCO is intended to ensure the instruments and control circuits will be OPERABLE if unit conditions require that the Remote Shutdown System be placed in operation.

APPLICABILITY

The Remote Shutdown System LCO is applicable in MODES 1, 2, and 3. This is required so that the unit can be placed and maintained in MODE 3 for an extended period of time from a location other than the control room.

This LCO is not applicable in MODE 4, 5, or 6. In these MODES, the facility is already subcritical and in a condition of reduced RCS energy. Under these conditions, considerable time is available to restore necessary instrument control functions if control room instruments or controls become unavailable.

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) → Note 2 has been added to the ACTIONS to clarify the application of Completion Time rules. Separate Condition entry is allowed for each Function listed on Table 3.3.4-1. 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.

(continued)

TSTF-359, Rev. 5

BASES (continued)

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 to minimize challenges to the pressurizer safety valves.

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 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

Note 1 has been added to clarify that all pressurizer PORVs 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. Testing is not performed in lower MODES.

A.1

With the PORVs inoperable and capable of being manually cycled, either the PORVs must be restored or the flow path isolated within 1 hour. The block valves should be closed but power must be maintained to the associated block valves, since removal of power would render the block valve inoperable. Although a PORV may be designated inoperable, it may be able to be manually opened and closed, and therefore, able to perform its function. PORV inoperability may be due to seat leakage, instrumentation problems, automatic control problems, or other causes that do not prevent manual use and do not create a possibility for a

(continued)

ACTIONS

A.1 and A.2 (continued)

must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage.

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 adequacy of the RCS water inventory balance required by Required Action A.1.

Required Action A.1 is 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 monitor is inoperable. This allowance is provided because other instrumentation is available to monitor RCS leakage.

B.1.1, B.1.2, B.2.1, and B.2.2

With both gaseous and particulate containment atmosphere radioactivity monitoring instrumentation channels inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed or water inventory balances, in accordance with SR 3.4.13.1, must be performed to provide alternate periodic information.

With a sample obtained and analyzed or water inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of the required containment atmosphere radioactivity monitors. Alternatively, continued operation is allowed if the air cooler condensate flow rate monitoring system is OPERABLE, provided grab samples are taken every 24 hours.

The 24 hour interval provides periodic information that is adequate to detect leakage. The 30 day Completion Time recognizes at least one other form of leakage detection is available.

Required Action B.1 and Required Action B.2 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 gaseous and particulate containment atmosphere radioactivity monitor channel is inoperable. This allowance

(continued)

ACTIONS

B.1.1, B.1.2, B.2.1, and B.2.2 (continued)

is provided because other instrumentation is available to monitor for RCS LEAKAGE.

C.1 and C.2

With the required containment air cooler condensate flow rate monitor inoperable, alternative action is again required. Either SR 3.4.15.1 must be performed or water inventory balances, in accordance with SR 3.4.13.1, must be performed to provide alternate periodic information. Provided a CHANNEL CHECK is performed every 8 hours or a water inventory balance is performed every 24 hours, reactor operation may continue while awaiting restoration of the containment air cooler condensate flow rate monitor to OPERABLE status.

The 24 hour interval provides periodic information that is adequate to detect RCS LEAKAGE.

D.1 and D.2

With the required containment atmosphere radioactivity monitor and the required containment air cooler condensate flow rate monitor inoperable, the only means of detecting leakage is the containment sump monitor. This Condition does not provide the required diverse means of leakage detection. The Required Action is to restore either of the inoperable required monitors to OPERABLE status within 30 days to regain the intended leakage detection diversity. The 30 day Completion Time ensures that the plant will not be operated in a reduced configuration for a lengthy time period.

E.1 and E.2

If a Required Action of Condition A, B, [C], or [D] cannot be met, the plant must be brought to a MODE in which the requirement 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 allowed Completion Times are reasonable, based on operating experience, to reach the

(continued)

TSTF-359, Rev. 5

BASES (continued)

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 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.

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.

B.1 and B.2

With the gross specific activity in excess of the allowed limit, an analysis must be performed within 4 hours to determine DOSE EQUIVALENT I-131. The Completion Time of 4 hours is required to obtain and analyze a sample.

The change within 6 hours to MODE 3 and RCS average temperature < 500°F lowers the saturation pressure of the reactor coolant below the setpoints of the main steam safety valves and prevents venting the SG to the environment in an SGTR event. The allowed Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 below 500°F from full power conditions in an orderly manner and without challenging plant systems.

(continued)

TSTF-359 Rev 5

BASES

ACTIONS

A.1 (continued)

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.

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 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 hydrogen recombiners inoperable for up to 7 days. Seven days is a reasonable time to allow two hydrogen recombiners to be inoperable because the hydrogen control function is

(continued)

TSTF-359 Rev 5

BASES

ACTIONS

A.1 (continued)

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 trains 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 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 HMS trains inoperable for up to 7 days. Seven days

(continued)

BASES

LCO (continued)

the condenser is unavailable for use with the Steam Bypass System.

An ADV is considered OPERABLE when it is capable of providing controlled relief of the main steam flow and capable of fully opening and closing on demand.

APPLICABILITY

In MODES 1, 2, and 3, and in MODE 4, when a steam generator is being relied upon for heat removal, the ADVs are required to be OPERABLE.

In MODE 5 or 6, an SGTR is not a credible event.

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

(continued)

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 When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall ~~not~~ only 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

Insert 1

(continued)

TSTF-359, Rev. 5

3.0 LCO APPLICABILITY

LCO 3.0.4 (continued) 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. These exceptions allow entry into MODES or other specified conditions in the Applicability when the associated ACTIONS to be entered allow unit operation in the MODE or other specified condition in the Applicability only for a limited period of time.

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.

Reviewers'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.

(continued)

3.0 SR APPLICABILITY

SR 3.0.3 (continued) 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 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.

Insert 2

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.

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.

TSTF-359, Rev. 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
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. AND B.2 Restore one trip unit to OPERABLE status.	1 hour [48] hours
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. OR C.2 Restrict THERMAL POWER to ≤ 90% of the maximum allowed THERMAL POWER level.	24 hours 24 hours
D. One or more Functions with one automatic bypass removal channel inoperable.	D.1 Disable bypass channel. OR D.2.1 Place affected trip units in bypass or trip. AND	1 hour 1 hour

(continued)

TSTF-359, Rev 5

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. (continued)	D.2.2.1 Restore bypass removal channel and affected trip units to OPERABLE status. OR D.2.2.2 Place affected trip units in trip.	[48] hours 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. OR E.2.1 Place one affected trip unit in bypass and place the other in trip for each affected trip Function. AND E.2.2 Restore one bypass channel and the associated trip unit to OPERABLE status for each affected trip Function.	 1 hour 1 hour [48] hours
F. Required Action and associated Completion Time not met.	F.1 Be in MODE 3.	6 hours

TSTF-359, Rev. 5

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 unit to 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 trip units in trip.	48 hours

(continued)

TSTF-359, Rev. 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Two automatic bypass removal channels inoperable.	~~NOTE~~ LCO ~~3.0.4~~ is not ~~applicable.~~	
	D.1 Disable bypass channels.	1 hour
	OR	
	D.2.1 Place one affected trip unit in bypass and place the other in trip.	1 hour
	AND	
	D.2.2 Restore one bypass channel and the associated trip unit to OPERABLE status.	[48] hours
E. Required Action and associated Completion Time not met.	E.1 Open all RTCBs.	6 hours

TSTF-351, Rev 5

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

(continued)

TSTF-359, Rev 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
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	
	E.2.1 Place one affected trip unit in bypass and place the other in trip for each affected ESFAS Function.	1 hour
	AND	
	E.2.2 Restore one bypass channel and the associated trip unit to OPERABLE status for each affected trip Function.	48 hours
F. Required Action and associated Completion Time not met.	F.1 Be in MODE 3.	6 hours
	AND	
	F.2 Be in MODE 4.	[12] hours

TSTF-359, Rev 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One or more Functions with two channels per DG inoperable.	B.1 Enter applicable Conditions and Required Actions for the associated DG made inoperable by DG—LOVS instrumentation.	1 hour
	OR	
	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

TSTF-359, Rev. 5

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 5.6.8.	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

(continued)

TSTF-359, Rev. 5

3.3 INSTRUMENTATION

3.3.12 Remote Shutdown System (Analog)

LCO 3.3.12 The Remote Shutdown System Functions in Table 3.3.12-1 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 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.	6 hours
	AND		
	B.2	Be in MODE 4.	[12] hours

TSTF-359, Rev. 5

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

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

1. Separate Condition entry is allowed for each RPS Function.
2. If a channel is placed in bypass, continued operation with the channel in the bypassed condition for the Completion Time specified by Required Action A.2 or C.2.2 shall be reviewed in accordance with Specification 5.5.1.2.e.

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

(continued)

TSTF-359, Rev 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One or more Functions with one automatic bypass removal channel inoperable.	C.1 Disable bypass channel. OR	1 hour
	C.2.1 Place affected automatic trip channel in bypass or trip. AND	1 hour
	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. OR	1 hour
	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

(continued)

TSTF-359, Rev. 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
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
C. One automatic bypass removal channel inoperable.	C.1 Disable bypass channel. OR C.2.1 Place affected automatic trip channel in bypass or trip. AND 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. OR	1 hour

(continued)

TSTF-359, Rev 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
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	
	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	

(continued)

TSTF-359, Rev. 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One or more Functions with two channels per DG inoperable.	B.1 Enter applicable Conditions and Required Actions for the associated DG made inoperable by DG—LOVS instrumentation.	1 hour
	OR	
	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

TSTF-359, Rev 5

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.

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 5.6.8.	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

(continued)

TSTF-359, Rev. 5

3.3 INSTRUMENTATION

3.3.12 Remote Shutdown System (Digital)

LCO 3.3.12 The Remote Shutdown System Functions in Table 3.3.12-1 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 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.	6 hours
	AND		
	B.2	Be in MODE 4.	[12] hours

TSTF-359, Rev 5

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.
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

(continued)

TSTF-359, Rev. 5

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; [and]

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

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Required containment sump monitor inoperable. [OR Required containment air cooler flow rate monitor inoperable.]	----------NOTE---------- LCO 3.0.4 is not applicable. ----------		
	A.1	Perform SR 3.4.13.1.	Once per 24 hours
	AND		
	A.2	Restore containment sump monitor to OPERABLE status.	30 days

(continued)

TSTF-359, Rev. 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required containment atmosphere radioactivity monitor inoperable.	~~NOTE~~ ~~LCO 3.0.4 is not applicable.~~	
	B.1.1 Analyze grab samples of the containment atmosphere.	Once per 24 hours
	OR	
	B.1.2 Perform SR 3.4.13.1.	Once per 24 hours
	AND	
	B.2.1 Restore required containment atmosphere radioactivity monitor to OPERABLE status.	30 days
	OR	
	B.2.2 Verify containment air cooler condensate flow rate monitor is OPERABLE.	30 days
C. Required containment air cooler condensate flow rate monitor inoperable.	C.1 Perform SR 3.4.15.1.	Once per 8 hours
	OR	
	C.2 Perform SR 3.4.13.1.	Once per 24 hours

(continued)

TSTF-359, Rev. 5

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.16 RCS Specific Activity

LCO 3.4.16 The specific iodine 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. ----------		
	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

(continued)

TSTF-359, Rev 5

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 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

TSTF-359, Rev 5

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 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

TSTF-359 Rev 5

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 [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.	[12] hours

TSTF-359, Rev. 5.

BASES

LCO 3.0.3 (continued)

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

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

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.

Insert 3

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.

(continued)

TSTF-359, Rev 5

BASES

LCO 3.0.4 (continued)

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. 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.]

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

(continued)

TSTF-359, Rev. 5

BASES

SR 3.0.3 (continued) period, then the equipment is inoperable, or the variable is outside the specified limits and the Completion Times of the Required Actions for the applicable LCO Conditions begin immediately upon the failure of the Surveillance.

Completion of the Surveillance within the delay period allowed by this Specification, or within the Completion Time of the ACTIONS, restores compliance with SR 3.0.1.

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

(continued)

TSTF-359, Rev. 5

BASES

ACTIONS

B.1 and B.2 (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. 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

(continued)

TSTF-359, Rev 5

BASES

ACTIONS

C.1 and C.2 (continued)

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 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

(continued)

TSTF-359, Rev. 5

BASES

ACTIONS

E.1, E.2.1, and E.2.2 (continued)

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 Condition A, B, C, D, or E are not met.

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 be in MODE 3 is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

The SRs for any particular RPS Function are found in the SR column of Table 3.3.1-1 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 plant to take credit for topical reports as the basis for justifying Frequencies, topical reports must be supported by an NRC staff SER that establishes the acceptability of each topical report for that plant (Ref. 8).]

SR 3.3.1.1

Performance of the CHANNEL CHECK 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 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

(continued)

TSTF-359, Rev. 5

BASES

ACTIONS

B.1 and B.2 (continued)

actions for the failed channels, while ensuring 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.

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.

(continued)

TSTF 359, Rev 5

BASES

ACTIONS (continued)

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 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.

(continued)

TSTF-359, Rev 5

BASES

ACTIONS

C.1 and C.2 (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.

(continued)

ACTIONS

E.1, E.2.1, and E.2.2 (continued)

logic. Failures in the actuation subsystems, including the manual bypass key switches, are considered Actuation Logic failures and are addressed in LCO 3.3.5.

In Condition E, it is permissible to continue operation with two bypass permissive channels failed, providing the bypasses are disabled in a similar manner as discussed for Condition D.

If the failed bypasses cannot be disabled, actions to address the inoperability of the affected automatic trip channels must be taken. 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.

(continued)

TSTF-359, Rev 5

BASES

ACTIONS (continued)

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.

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.

C.1

Condition C applies when more than two undervoltage or Degraded Voltage channels on a single bus are inoperable.

Required Action C.1 requires all but two channels to be restored to OPERABLE status within 1 hour. With more than two channels inoperable, the logic is not capable of providing a DG—LOVS signal for valid Loss of Voltage or Degraded Voltage conditions. The 1 hour Completion Time is

(continued)

TSTF-359, Rev. 5

BASES

LCO (continued)

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 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

(continued)

BASES

TSTF-359, Rev 5

LCO (continued)

as one channel of any of the alternate information or control sources for each Function is OPERABLE.

The Remote Shutdown System instrumentation and control circuits covered by this LCO do not need to be energized to be considered OPERABLE. This LCO is intended to ensure that the instrument and control circuits will be OPERABLE if plant conditions require that the Remote Shutdown System be placed in operation.

APPLICABILITY

The Remote Shutdown System LCO is applicable in MODES 1, 2, and 3. This is required so that the unit can be placed and maintained in MODE 3 for an extended period of time from a location other than the control room.

This LCO is not applicable in MODE 4, 5, or 6. In these MODES, the unit is already subcritical and in the condition of reduced RCS energy. Under these conditions, considerable time is available to restore necessary 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 listed in Table 3.3.12-1. The Completion Time(s) of the inoperable channel(s)/train(s) of a Function will be

(continued)

TSTF-359, Rev 5

BASES

ACTIONS

B.1 (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.

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 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.

C.1, C.2.1, and C.2.2

Condition C applies to one automatic bypass removal channel inoperable. If the inoperable bypass removal channel for any bypass channel 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 affected automatic trip channel placed

(continued)

TSTF-359, Rev. 5

BASES

ACTIONS

C.1, C.2.1, and C.2.2 (continued)

in bypass or trip. The bypass removal channel and the automatic trip channel must be repaired prior to entering MODE 2 following the next MODE 5 entry. The 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.

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

(continued)

ACTIONS

A.1, and A.2 (continued)

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 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.

(continued)

ACTIONS (continued)

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 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.

(continued)

ACTIONS

A.1 and A.2 (continued)

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:

1. Safety Injection Actuation Signal
   Containment Pressure—High
   Pressurizer Pressure—Low

2. Containment Spray Actuation Signal
   Containment Pressure—High High
   Automatic SIAS

3. Containment Isolation Actuation Signal
   Containment Pressure—High
   Pressurizer Pressure—Low

4. Main Steam Isolation Signal
   Steam Generator Pressure—Low
   Containment Pressure—High

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

(continued)

ACTIONS

C.1, C.2.1, and C.2.2 (continued)

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 operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

(continued)

ACTIONS

A.1 and A.2 (continued)

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.

(continued)

TSTF-359, Rev. 5

BASES

LCO (continued) 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 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

(continued)

TSTF-359, Rev 5

BASES

LCO (continued)

sources. In these cases, the Remote Shutdown System is OPERABLE as long as one channel of any of the alternate information or control sources for each Function is OPERABLE.

The Remote Shutdown System instrumentation and control circuits covered by this LCO do not need to be energized to be considered OPERABLE. This LCO is intended to ensure that the instrument and control circuits will be OPERABLE if plant conditions require that the Remote Shutdown System be placed in operation.

APPLICABILITY

The Remote Shutdown System LCO is applicable in MODES 1, 2, and 3. This is required so that the unit can be placed and maintained in MODE 3 for an extended period of time from a location other than the control room.

This LCO is not applicable in MODE 4, 5, or 6. In these MODES, the unit is already subcritical and in the condition of reduced RCS energy. Under these conditions, considerable time is available to restore necessary 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 listed in Table 3.3.12-1 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 listed in Table 3.3.12-1. The Completion Time(s)

(continued)

TSTF-359, Rev. 5

BASES

APPLICABILITY (continued) MODES 4, 5, and 6 with the reactor vessel head in place. LCO 3.4.12 addresses the PORV requirements in these MODES.

ACTIONS

A.1

The ACTIONS are modified by two Notes. Note 1 clarifies that all pressurizer PORVs 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. Testing is typically not performed in lower MODES.

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 may be able to be manually opened and closed and in this manner can be used to perform its function. PORV inoperability may be due to seat leakage, instrumentation problems, automatic control problems, or other causes that do not prevent manual use and do not create a possibility for a small break LOCA. For these reasons, the block valve may be closed but the Action requires power be maintained to the valve. This Condition is only intended to permit operation of the plant for a limited period of time not to exceed the next refueling outage (MODE 6) so that maintenance can be performed on the PORVs to eliminate the problem condition. The PORVs should normally be available for automatic mitigation of overpressure events and should be returned to OPERABLE status prior to entering startup (MODE 2).

Quick access to the PORV for pressure control can be made when power remains on the closed block valve. The Completion Time of 1 hour is based on plant operating experience that minor problems can be corrected or closure can be accomplished in this time period.

(continued)

TSTF-359, Rev. 5

BASES

ACTIONS

A.1 and A.2 (continued)

at an increased frequency of 24 hours to provide information that is adequate to detect leakage.

Restoration of the 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 adequacy of the RCS water inventory balance required by Required Action A.1.

Required Action A.1 and Required Action A.2 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 monitor channel is inoperable. This allowance is provided because other instrumentation is available to monitor for RCS LEAKAGE.

B.1.1, B.1.2, B.2.1, and B.2.2

With both gaseous and particulate containment atmosphere radioactivity monitoring instrumentation channels inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed, or water inventory balances, in accordance with SR 3.4.13.1, must be performed to provide alternate periodic information. With a sample obtained and analyzed or an inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of at least one of the radioactivity monitors.

Alternatively, continued operation is allowed if the air cooler condensate flow rate monitoring system is OPERABLE, provided grab samples are taken every 24 hours.

The 24 hour interval provides periodic information that is adequate to detect leakage. The 30 day Completion Time recognizes at least one other form of leakage detection is available.

Required Actions B.1.1, B.1.2, B.2.1, and B.2.2 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 gaseous and particulate containment atmosphere radioactivity monitor channel is inoperable. This allowance

(continued)

TSTF-359, Rev 5

BASES

ACTIONS

B.1.1, B.1.2, B.2.1, and B.2.2 (continued)

is provided because other instrumentation is available to monitor for RCS LEAKAGE.

C.1 and C.2

If the required containment air cooler condensate flow rate monitor is inoperable, alternative action is again required. Either SR 3.4.15.1 must be performed, or water inventory balances, in accordance with SR 3.4.13.1, must be performed to provide alternate periodic information. Provided a CHANNEL CHECK is performed every 8 hours or an inventory balance is performed every 24 hours, reactor operation may continue while awaiting restoration of the containment air cooler condensate flow rate monitor to OPERABLE status.

The 24 hour interval provides periodic information that is adequate to detect RCS LEAKAGE.

D.1 and D.2

If the required containment atmosphere radioactivity monitor and the containment air cooler condensate flow rate monitor are inoperable, the only means of detecting leakage is the containment sump monitor. This Condition does not provide the required diverse means of leakage detection. The Required Action is to restore either of the inoperable monitors to OPERABLE status within 30 days to regain the intended leakage detection diversity. The 30 day Completion Times ensure that the plant will not be operated in a reduced configuration for a lengthy time period.

E.1 and E.2

If any Required Action of Condition A, B, [C], or [D] 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 allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full

(continued)

TSTF-359, Rev 5

BASES

LCO (continued)

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 $\geq$ 500°F, operation within the LCO limits for DOSE EQUIVALENT I-131 and gross specific activity is 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 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 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 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.

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.

(continued)

BASES

APPLICABILITY (continued)

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. 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. 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.]

(continued)

BASES

APPLICABILITY (continued)

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 main steam line break are low due to the pressure and temperature limitations of 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. 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.]

(continued)

BASES

LCO (continued)

in which the condenser is unavailable for use with the Steam Bypass System.

An ADV is considered OPERABLE when it is capable of providing a controlled relief of the main steam flow, and is capable of fully opening and closing on demand.

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

(continued)

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 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

Insert 1

(continued)

3.0 LCO APPLICABILITY

LCO 3.0.4 (continued) 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. These exceptions allow entry into MODES or other specified conditions in the Applicability when the associated ACTIONS to be entered allow unit operation in the MODE or other specified condition in the Applicability only for a limited period of time.

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.

(continued)

TSTF-359, Rev 5

3.0 SR APPLICABILITY

SR 3.0.3 (continued) 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 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.

Insert 2

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.

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 5.6.8.	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

(continued)

TSTF-359, Rev 5

3.3 INSTRUMENTATION

3.3.3.2 Remote Shutdown System

LCO 3.3.3.2 The Remote Shutdown System Functions in Table 3.3.3.2-1 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 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]

(continued)

TSTF-359, Rev. 5

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

(continued)

TSTF-359, Rev 5

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; [and]

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Drywell floor drain sump monitoring system inoperable.	----------NOTE---------- LCO 3.0.4 is not applicable. ----------	
	A.1 Restore drywell floor drain sump monitoring system to OPERABLE status.	30 days

(continued)

TSTF-359, Rev 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required primary containment atmospheric monitoring system inoperable.	----------NOTE---------- LCO 3.0.4 is not applicable. ----------	
	B.1 Analyze grab samples of primary containment atmosphere.	Once per 12 hours
	AND	
	B.2 Restore required primary containment atmospheric monitoring system to OPERABLE status.	30 days
C. Primary containment air cooler condensate flow rate monitoring system inoperable.	C.1 ---------NOTE-------- Not applicable when required primary containment atmospheric monitoring system is inoperable. ----------	
	Perform SR 3.4.6.1.	Once per 8 hours

(continued)

TSTF-359, Rev. 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required primary containment atmospheric monitoring system inoperable. AND Primary containment air cooler condensate flow rate monitoring system inoperable.	~~----------NOTE----------~~ ~~LCO 3.0.4 is not applicable.~~ ~~----------~~ D.1 Restore required primary containment atmospheric monitoring system to OPERABLE status. OR D.2 Restore primary containment air cooler condensate flow rate monitoring system to OPERABLE status.	30 days 30 days
E. Required Action and associated Completion Time of Condition A, B, [C, or D] not met.	E.1 Be in MODE 3. AND E.2 Be in MODE 4.	12 hours 36 hours
F. All required leakage detection systems inoperable.	F.1 Enter LCO 3.0.3.	Immediately

TSTF-359, Rev 5

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.~~ ~~----------~~	
	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	

(continued)

TSTF-359, Rev 5

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 removed from operation for up to 2 hours per 8 hour 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. AND	Immediately (continued)

TSTF-359 Rev 5

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 3.6.4 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 Once per 12 hours thereafter
	AND B.2	Restore one primary containment hydrogen recombiner to OPERABLE status.	7 days

(continued)

TSTF-359, Rev. 5

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 AND Once per 12 hours thereafter
	AND		
	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

TSTF-359, Rev. 5

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 AND Once per 12 hours thereafter
	AND		
	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

TSTF-359, Rev 5

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
	AND		
	A.2	Verify cooling water is aligned to DG [1B] from a Unit [1] PSW subsystem.	Once per 31 days
	AND		
	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

TSTF-359, Rev 5

BASES

LCO 3.0.3 (continued)

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

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

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.

Insert 3

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.

P 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

(continued)

TSTF-359, Rev 5

BASES

LCO 3.0.4 (continued)

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. 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.]

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

LCO 3.0.5

(continued)

TSTF-359, Rev 5

BASES

SR 3.0.3 (continued)

Required Actions for the applicable LCO Conditions begin immediately upon the failure of the Surveillance.

Completion of the Surveillance within the delay period allowed by this Specification, or within the Completion Time of the ACTIONS, restores compliance with SR 3.0.1.

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

(continued)

TS TF-359, Rev 5

BASES

LCO

13. Suppression Pool Water Temperature (continued)

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.

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 an accident using alternative instruments and methods, and the low probability of an event requiring these instruments.

(continued)

TSTF-359, Rev 5

BASES

ACTIONS (continued) (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 5.6.8, 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.

(continued)

TSTF-359, Rev 5

BASES

LCO (continued)

channel of any of the alternate information or control sources for each Function is OPERABLE.

The Remote Shutdown System instruments and control circuits covered by this LCO do not need to be energized to be considered OPERABLE. This LCO is intended to ensure that the instruments and control circuits will be OPERABLE if plant conditions require that the Remote Shutdown System be placed in operation.

APPLICABILITY

The Remote Shutdown System LCO is applicable in MODES 1 and 2. This is required so that the plant can be placed and maintained in MODE 3 for an extended period of time from a location other than the control room.

This LCO is not applicable in MODES 3, 4, and 5. In these MODES, the plant is already subcritical and in a condition of reduced Reactor Coolant System energy. Under these conditions, considerable time is available to restore necessary instrument control Functions if control room instruments or control becomes unavailable. Consequently, the TS do not require OPERABILITY in MODES 3, 4, and 5.

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) → 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.

(continued)

TSTF-359, Rev. 5

BASES

ACTIONS

B.1 (continued)

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.

C.1

A failure of two pressure switch channels associated with one S/RV tailpipe could result in the loss of the LLS function (i.e., multiple actuations of the S/RV would go undetected by the LLS logic). However, the S/RVs are organized in groups and, during an event, groups of S/RVs initially open (setpoints are at same settings for a total of 11 S/RVs in three groups). Therefore, it would be very unlikely that a single S/RV would be required to arm all the LLS logic. Therefore, it is acceptable to allow 14 days to restore one pressure switch of the associated S/RV to OPERABLE status (Required Action C.1). However, this allowable out of service time is only acceptable provided each LLS is OPERABLE (Refer to Required Action A.1 and D.1 Bases). If one inoperable tailpipe pressure switch cannot

(continued)

TSTF-359, Rev 5

BASES

APPLICABLE SAFETY ANALYSES (continued)

RCS leakage detection instrumentation satisfies Criterion 1 of the NRC Policy Statement.

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

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. Required Action A.1 is 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 monitoring system is inoperable. This allowance is provided because other instrumentation is available to monitor RCS leakage.

(continued)

TSTF-359, Rev. 5

BASES

ACTIONS (continued)

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 least one other form of drywell leakage detection (i.e., air cooler condensate flow rate monitor) is available.]

The 12 hour interval provides periodic information that is adequate to detect LEAKAGE. The 30 day Completion Time for restoration recognizes that at least one other form of leakage detection is available.

The Required 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 both the gaseous and particulate primary containment atmospheric monitoring channels are inoperable. This allowance is provided because other instrumentation is available to monitor RCS leakage.

C.1

With the required primary containment air cooler condensate flow rate monitoring system inoperable, SR 3.4.6.1 must be performed every 8 hours to provide periodic information of activity in the primary containment at a more frequent interval than the routine Frequency of SR 3.4.7.1. The 8 hour interval provides periodic information that is adequate to detect LEAKAGE and recognizes that other forms of leakage detection are available. However, this Required Action is modified by a Note that allows this action to be not applicable if the required primary containment atmospheric monitoring system is inoperable. Consistent with SR 3.0.1, Surveillances are not required to be performed on inoperable equipment.

(continued)

TSTF-359, Rev 5

BASES

ACTIONS (continued)

D.1 and D.2

With both the primary containment gaseous and particulate atmospheric monitor channels and the primary containment air cooler condensate flow rate monitor inoperable, the only means of detecting LEAKAGE is the drywell floor drain sump monitor. This condition does not provide the required diverse means of leakage detection. The Required Action is to restore either of the inoperable monitors to OPERABLE status within 30 days to regain the intended leakage detection diversity. The 30 day Completion Time ensures that the plant will not be operated in a degraded configuration for a lengthy time period.

The Required 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 both the gaseous and particulate primary containment atmospheric monitoring channels and air cooler condensate flow rate are inoperable. This allowance is provided because other instrumentation is available to monitor RCS leakage.

E.1 and E.2

If any Required Action of Condition A, B, [C, or D] cannot be met within the associated 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 12 hours and MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to perform the actions in an orderly manner and without challenging plant systems.

F.1

With all required monitors inoperable, no required automatic means of monitoring LEAKAGE are available, and immediate plant shutdown in accordance with LCO 3.0.3 is required.

(continued)

ACTIONS

A.1 and A.2 (continued)

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.

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 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, B.2.1, B.2.2.1, and B.2.2.2

If the DOSE EQUIVALENT I-131 cannot be restored to $\leq$ 0.2 μCi/gm within 48 hours, or if at any time it is > 4.0 μCi/gm, it must be determined at least once every 4 hours and all the main steam lines must be isolated within 12 hours. Isolating the main steam lines precludes the possibility of releasing radioactive material to the environment in an amount that is more than a small fraction of the requirements of 10 CFR 100 during a postulated MSLB accident.

Alternatively, the plant can be placed in MODE 3 within 12 hours and in MODE 4 within 36 hours. This option is provided for those instances when isolation of main steam lines is not desired (e.g., due to the decay heat loads). In MODE 4, the requirements of the LCO are no longer applicable.

The Completion Time of once every 4 hours is the time needed to take and analyze a sample. The 12 hour Completion Time is reasonable, based on operating experience, to isolate the main steam lines in an orderly manner and without challenging plant systems. Also, the allowed Completion Times for Required Actions B.2.2.1 and B.2.2.2 for placing the unit in MODES 3 and 4 are reasonable, based on operating

(continued)

TSTF-359, Rev 5

BASES

APPLICABILITY (continued)

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 3.4.9, "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 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

(continued)

TSTF-359, Rev 5

BASES

ACTIONS

A.1 (continued)

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.

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 primary containment 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 [Primary Containment Inerting System or one subsystem of the Containment Atmosphere Dilution 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 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)

TSTF-359 Rev 5

BASES

LCO (continued)

Operation with at least one fan provides the capability of controlling the bulk hydrogen concentration in primary containment without exceeding the flammability limit.

APPLICABILITY

In MODES 1 and 2, the two [Drywell Cooling System fans] ensure the capability to prevent localized hydrogen concentrations above the flammability limit of 4.0 v/o in drywell, assuming a worst case single active 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 [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

(continued)

TSTF 359 Rev 5

BASES

ACTIONS

A.1 (continued)

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 capabilities are provided by the [Primary Containment Inerting System or one subsystem of the Containment Atmosphere Dilution 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 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 [Drywell Cooling System fans] inoperable for up to 7 days. Seven days is a reasonable time to allow two [Drywell Cooling System fans] 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.

(continued)

BASES (continued)

ACTIONS

A.1

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 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,

(continued)

TSTF-257 Rev 5

BASES (continued)

APPLICABILITY The requirements for OPERABILITY of the DG [1B] SSW System are governed by the required OPERABILITY of the DG [1B] (LCO 3.8.1, "AC Sources—Operating," and LCO 3.8.2, "AC Sources—Shutdown").

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

(continued)

TSTF-359, Rev. 5

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 When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall only be made 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

Insert 1

(continued)

3.0 LCO APPLICABILITY

TSTF-359, Rev 5

LCO 3.0.4 (continued) 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. These exceptions allow entry into MODES or other specified conditions in the Applicability when the associated ACTIONS to be entered allow unit operation in the MODE or other specified condition in the Applicability only for a limited period of time.

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.

Reviewers'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.

(continued)

3.0 SR APPLICABILITY

TSTF-359, Rev 5

SR 3.0.3 (continued) 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 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.

Insert 2

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.

Reviewers'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.

TSTF-359, Rev 5

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 5.6.8.	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

(continued)

TSTF-359, Rev 5

3.3 INSTRUMENTATION

3.3.3.2 Remote Shutdown System

LCO 3.3.3.2 The Remote Shutdown System Functions in Table 3.3.3.2-1 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 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

(continued)

TSTF-359, Rev 5

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; [and]

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

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Drywell floor drain sump monitoring system inoperable.	~~NOTE~~ ~~LCO 3.0.4 is not applicable.~~ A.1 Restore drywell floor drain sump monitoring system to OPERABLE status.	30 days

(continued)

TSTF-359, Rev. 5

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required drywell atmospheric monitoring system inoperable.	----------NOTE---------- LCO 3.0.4 is not applicable. ----------	
	B.1 Analyze grab samples of drywell atmosphere.	Once per 12 hours
	AND	
	B.2 Restore required drywell atmospheric monitoring system to OPERABLE status.	30 days
C. Drywell air cooler condensate flow rate monitoring system inoperable.	----------NOTE---------- Not applicable when the required drywell atmospheric monitoring system is inoperable. ----------	
	C.1 Perform SR 3.4.7.1.	Once per 8 hours
D. Required drywell atmospheric monitoring system inoperable. AND Drywell air cooler condensate flow rate monitoring system inoperable.	----------NOTE---------- LCO 3.0.4 is not applicable. ----------	
	D.1 Restore required drywell atmospheric monitoring system to OPERABLE status. OR	30 days

(continued)

TSTF-359, Rev. 5

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 ≤ [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. ----------	
	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.	B.1 Determine DOSE EQUIVALENT I-131.	Once per 4 hours
	AND	
OR	B.2.1 Isolate all main steam lines.	12 hours
	OR	
Reactor coolant Specific activity > [4.0] μCi/gm DOSE EQUIVALENT I-131.		

(continued)

TSTF-359, Rev 5

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 removed from operation for up to 2 hours per 8 hour 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. AND	Immediately (continued)

TSTF-359, Rev 5

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. AND B.2 Restore one primary containment hydrogen recombiner to OPERABLE status.	1 hour AND One per 12 hours thereafter 7 days

(continued)

TSTF-359, Rev 5

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. AND B.2 Restore one primary containment and drywell hydrogen ignitor division to OPERABLE status.	1 hour AND Once per 12 hours thereafter 7 days

(continued)

TSTF-359, Rev. 5

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 AND Once per 12 hours thereafter
	AND		
	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

TSTF-359, Rev 5

BASES

LCO 3.0.3 (continued)

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

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

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

Insert 3

(continued)

TSTF-359, Rev 5

BASES

LCO 3.0.4 (continued)

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. 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.]

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.

(continued)

TSTF-359, Rev 5

BASES

SR 3.0.3 (continued) Completion of the Surveillance within the delay period allowed by this Specification, or within the Completion Time of the ACTIONS, restores compliance with SR 3.0.1.

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.

(continued)

BASES (continued)

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.

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

If a channel has not been restored to OPERABLE status in 30 days, this Required Action specifies initiation of actions in accordance with Specification 5.6.8, which

(continued)

TSTF-359 Rev 5

BASES

LCO (continued)

channel of any of the alternate information or control sources for each Function is OPERABLE.

The Remote Shutdown System instruments and control circuits covered by this LCO do not need to be energized to be considered OPERABLE. This LCO is intended to ensure that the instruments and control circuits will be OPERABLE if plant conditions require that the Remote Shutdown System be placed in operation.

APPLICABILITY

The Remote Shutdown System LCO is applicable in MODES 1 and 2. This is required so that the plant can be placed and maintained in MODE 3 for an extended period of time from a location other than the control room.

This LCO is not applicable in MODES 3, 4, and 5. In these MODES, the plant is already subcritical and in a condition of reduced Reactor Coolant System energy. Under these conditions, considerable time is available to restore necessary instrument control Functions if control room instruments or control becomes unavailable. Consequently, the TS do not require OPERABILITY in MODES 3, 4, and 5.

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) → 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.

(continued)

TSTF-359, Rev 5

BASES

APPLICABLE SAFETY ANALYSES (continued)

Therefore, these actions provide adequate response before a significant break in the RCPB can occur.

RCS leakage detection instrumentation satisfies Criterion 1 of the NRC Policy Statement.

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 3.4.5. This Applicability is consistent with that for LCO 3.4.5.

ACTIONS

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. Required Action A.1 is 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 monitoring system

(continued)

ACTIONS

A.1 (continued)

is inoperable. This allowance is provided because other instrumentation is available to monitor RCS leakage.

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.]

The 12 hour interval provides periodic information that is adequate to detect LEAKAGE. The 30 day Completion Time for restoration recognizes that at least one other form of leakage detection is available.

The Required 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 both the gaseous and particulate primary containment atmospheric monitoring channels are inoperable. This allowance is provided because other instrumentation is available to monitor RCS leakage.

C.1

With the required drywell air cooler condensate flow rate monitoring system inoperable, SR 3.4.7.1 is performed every 8 hours to provide periodic information of activity in the drywell at a more frequent interval than the routine Frequency of SR 3.4.7.1. The 8 hour interval provides periodic information that is adequate to detect LEAKAGE and recognizes that other forms of leakage detection are available. However, this Required Action is modified by a Note that allows this action to be not applicable if the required drywell atmospheric monitoring system is inoperable. Consistent with SR 3.0.1, Surveillances are not required to be performed on inoperable equipment.

(continued)

TSTF-359, Rev 5

BASES

ACTIONS (continued)

D.1 and D.2

With both the gaseous and particulate drywell atmospheric monitor channels and the drywell air cooler condensate flow rate monitor inoperable, the only means of detecting LEAKAGE is the drywell floor drain sump monitor. This Condition does not provide the required diverse means of leakage detection. The Required Action is to restore either of the inoperable monitors to OPERABLE status within 30 days to regain the intended leakage detection diversity. The 30 day Completion Time ensures that the plant will not be operated in a degraded configuration for a lengthy time period. The Required 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 both the gaseous and particulate primary containment atmospheric monitoring channels and air cooler condensate flow rate are inoperable. This allowance is provided because other instrumentation is available to monitor RCS leakage.

E.1 and E.2

If any Required Action of Condition A, B, [C, or D] cannot be met within the associated 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 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions in an orderly manner and without challenging plant systems.

F.1

With all required monitors inoperable, no required automatic means of monitoring LEAKAGE are available, and immediate plant shutdown in accordance with LCO 3.0.3 is required.

SURVEILLANCE REQUIREMENTS

SR 3.4.7.1

This SR requires the performance of a CHANNEL CHECK of the required drywell atmospheric monitoring system. The check gives reasonable confidence that the channel is operating

(continued)

APPLICABLE SAFETY ANALYSES (continued)

outside containment during steady state operation, will not exceed 10% of the dose guidelines of 10 CFR 100.

The limits on specific activity are values from a parametric evaluation of typical site locations. These limits are conservative because the evaluation considered more restrictive parameters than for a specific site, such as the location of the site boundary and the meteorological conditions of the site.

RCS specific activity satisfies Criterion 2 of the NRC Policy Statement.

LCO

The specific iodine activity is limited to $\leq$ [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 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 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

(continued)

TSTF-359, Rev 5

BASES

ACTIONS (continued)

restore transient specific activity excursions while the plant remains at, or proceeds to power operation.

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.

B.1, B.2.1, B.2.2.1, and B.2.2.2

If the DOSE EQUIVALENT I-131 cannot be restored to ≤ [0.2] μCi/gm within 48 hours, or if at any time it is > [4.0] μCi/gm, it must be determined at least every 4 hours and all the main steam lines must be isolated within 12 hours. Isolating the main steam lines precludes the possibility of releasing radioactive material to the environment in an amount that is more than a small fraction of the requirements of 10 CFR 100 during a postulated MSLB accident.

Alternately, the plant can be brought to MODE 3 within 12 hours and to MODE 4 within 36 hours. This option is provided for those instances when isolation of main steam lines is not desired (e.g., due to the decay heat loads). In MODE 4, the requirements of the LCO are no longer applicable.

The Completion Time of once every 4 hours is the time needed to take and analyze a sample. The 12 hour Completion Time is reasonable, based on operating experience, to isolate the main steam lines in an orderly manner and without challenging plant systems. Also, the allowed Completion Times for Required Actions B.2.2.1 and B.2.2.2 for bringing the plant to MODES 3 and 4 are reasonable, based on

(continued)

TSTF-359, Rev 5

BASES

APPLICABILITY (continued)

"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 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

(continued)

TSTF-359 Rev 5

BASES (continued)

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 production 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 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

(continued)

TSTF-359 Rev 5

BASES

ACTIONS

A.1 (continued)

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.]

With two primary containment 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 [one division of the hydrogen ignitors]. 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 hydrogen recombiners inoperable for up to 7 days. Seven days is a reasonable time to allow two hydrogen recombiners 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 the amounts capable of exceeding the flammability limit.

(continued)

ACTIONS

A.1 (continued)

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 reasonable period of time to verify that a loss of hydrogen control function does not exist. The verification may be performed as an administrative check by examining logs or other information to determine the availability of the alternate hydrogen control capabilities. It does not mean to perform the Surveillances needed to demonstrate OPERABILITY of the alternate hydrogen control capabilities. If the ability to perform the hydrogen control function is maintained, continued operation is permitted with two ignitor divisions inoperable for up to 7 days. Seven days is a reasonable time to allow two ignitor divisions 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 the amounts capable of exceeding the flammability limit.

(continued)

BASES (continued)

APPLICABILITY

In MODES 1 and 2, the two [drywell purge] subsystems ensure the capability to prevent localized hydrogen concentrations above the flammability limit of 4.0 v/o in the drywell, assuming a worst case single active 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 [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.

(continued)