NUCLEAR ENERGY INSTITUTE

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January 5, 2001

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

Dear Mr. Beckner:

This letter transmits a technical report prepared by the BWR Owners Group to facilitate NRC's review of Initiative 1 of the risk-informed technical specification effort, relative to end states for technical specification action requirements. The enclosed report, NEDC-32988, Rev 2, "Technical Justification to Support Risk-Informed Modification to Selected Required Action End States for BWR Plants" contains the technical justification for risk-informed end states for the BWR product line.

It is our understanding that, due to the generic nature of this effort, no review fees will be incurred to NEI or the BWR Owners Group relative to NRC review of the enclosed report, and issuance of the related standard technical specifications change.

Please contact me, or Biff Bradley of the NEI staff, if you have any questions.

Sincerely,

Anthony R. Pietrangelo

Anthony R. Pietrangelo

Enclosure

Cc: R. M. Pulsifer, NRC (w/ enclosure)
R. A. Hill, GE (w/o enclosure)

NMSS11

GE Nuclear Energy

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Technical Justification to Support Risk-Informed Modification to Selected Required Action End States for BWR Plants

BWR Owners' Group
Risk-Informed Technical Specification Committee

IMPORTANT NOTICE REGARDING CONTENTS OF THIS REPORT

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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.

ABSTRACT

This document provides the results of the application of risk informed analyses to identify improvements in final actions specified for inoperable conditions in BWR Technical Specifications. The analyses were conducted using an existing Probabilistic Safety Analysis (PSA) model for a BWR-4 plant. This plant model was modified to reflect the different shutdown modes specified in Technical Specifications. The risk related to the current cold shutdown end states were then compared to the risk of staying in hot shutdown while equipment is being restored to an operable condition.

The analyses conclude that plant safety and operational improvements can be achieved by remaining in hot shutdown for several inoperable conditions while equipment is being restored. The proposed end state improvements provide more systems and operational flexibility while avoiding risk sensitive cold shutdown required actions and alignments. The conclusions are applicable for all the BWR products (BWR-2 through 6).

CONTENTS

LIST OF TABLES

ACRONYMS

AC	Alternating Current
ADS	Automatic Depressurization System
ASME	American Society of Mechanical Engineers
ATWS	Anticipated Transients Without Scram
BOP	Balance of Plant
BWR	Boiling Water Reactor
BWROG	Boiling Water Reactor Owners' Group
CDF	Core Damage Frequency
CE	Combustion Engineering
CEOG	Combustion Engineering Owners' Group
CRD	Control Rod Drive
CRFA	Control Room Fresh Air
CST	Condensate Storage Tank
DBA	Design Basis Accident
DC	Direct Current
DG	Diesel Generator
DW	Drywell
ECCS	Emergency Core Cooling System
EOP	Emergency Operating Procedure
EPG	Emergency Procedure Guidelines
EPM	Electric Power Monitoring
GE	General Electric

ACRONYMS
(Continued)

HPCI	High Pressure Coolant Injection
HPCS	High Pressure Core Spray
IPE	Individual Plant Examination
LCO	Limiting Condition for Operation
LCS	Leakage Control System
LERF	Large Early Release Frequency
LLS	Low-Low Set
LOCA	Loss-of-Coolant Accident
LPCI	Low Pressure Coolant Injection
LPCS	Low Pressure Core Spray
MCREC	Main Control Room Environmental Control
MSIV	Main Steam Isolation Valve
NRC	Nuclear Regulatory Commission
PCS	Power Conversion System
PSA	Probabilistic Safety Analysis
PSW	Plant Service Water
PVLCS	Penetration Valve Leakage Control System
PWR	Pressurized Water Reactor
RCIC	Reactor Core Isolation Cooling
RCPB	Reactor Coolant Pressure Boundary
RCS	Reactor Cooling System

ACRONYMS
(Continued)

RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RPS	Reactor Protection System
RPV	Reactor Pressure Vessel
SRV	Safety/Relief Valve
SDC	Shut-Down Cooling
SGTS	Standby Gas Treatment System
SJAE	Steam Jet Air Ejector
SPC	Suppression Pool Cooling
SSW	Standby Service Water
SW	Service Water
UHS	Ultimate Heat Sink

EXECUTIVE SUMMARY

This report provides the technical analysis to support the first of the Industry's Risk-Informed Technical Specifications improvement initiatives. This initiative is the "flagship" initiative for changing Technical Specifications based on risk information. The initiative would allow hot shutdown rather than requiring cold shutdown for selected Technical Specification end states. This report is a similar to the report submitted by the CE Owners' Group (CEOG) to the NRC, March 2000 (Reference 1), relating to the same initiative. This report provides the basis for changes to the BWR-4 and BWR-6 Standard Technical Specifications (References 2 and 3).

The analysis provides a systematic review of the risks associated with all Required Actions in Technical Specifications ending in placing the unit in cold shutdown (Mode 4). Cold shutdown is normally required when an inoperable system or train cannot be restored to an operable status within the allowed time. Going to cold shutdown results in the loss of steam-driven systems, challenges the shutdown heat removal systems, and requires restarting the plant. A more preferred operational mode is one that maintains adequate risk levels while repairs are completed without causing unnecessary challenges to plant equipment during shutdown and startup transitions. This analysis considered hot shutdown (Mode 3) as a preferred alternative to cold shutdown. Other potential preferred alternatives, such as low power operation, were outside the scope of this study.

The risks during the two modes of operation were evaluated using the Probabilistic Safety Analysis (PSA) for a typical BWR-4 plant, but the results are applicable for all the BWR models (BWR-2 through 6). The plant-specific PSA model was modified to evaluate the core damage frequency (CDF) during Mode 3 and Mode 4 conditions. This allowed a comparison of the risks between the two shutdown modes for various inoperable conditions specified in Technical Specifications. In addition to the quantitative analysis, the two modes of operation were evaluated based on defense-in-depth considerations. Based on these considerations, a list of proposed end state changes were identified.

A summary of proposed end state changes is presented in Table 1. Incorporation of the proposed changes not only enhances plant safety but also improves plant availability. Avoidance of cold shutdown entry was estimated for CE PWRs (Reference 1) to be about 8-16 hours per event. This corresponds to approximately $250K - $750K of averted cost per required cold shutdown. Similar operating cost benefits can be expected for BWR plants.

Table 1

Summary of Proposed End State Changes from Cold Shutdown (Mode 4) to Hot Shutdown (Mode 3)

BWR-4 Technical Specification			BWR-6 Technical Specification		
LCO Number	**Title**	**Basis Section**	**LCO Number**	**Title**	**Basis Section**
3.3.8.2	RPS Elect. Power Monitoring - Conditions A & B	5.5.1.1	3.3.8.2	RPS Elect. Power Monitoring - Conditions A & B	5.5.2.1
3.4.3	Safety/Relief Valves		3.4.4	Safety/Relief Valves	
A	One or Two S/RVs Inoperable	5.5.1.2	A	One S/R Valve Inoperable	5.5.2.2
3.5.1	ECCS System		3.5.1	ECCS System	
A	1 LPCI or 1 LPCS	5.5.1.3	A	1 LPCI or 1 LPCS	5.5.2.3
C	HPCI	5.5.1.3	B	HPCS	5.5.2.3
D	HPCI & 1 LPCI or 1 LPCS	5.5.1.3	C	Two Injection Subsystems or One Injection/One Spray Inoperable	5.5.2.3
E	1 ADS Valve	5.5.1.3	E	1 ADS Valve	5.5.2.3
F	1 ADS Valve & 1 LPCI or 1 LPCS	5.5.1.3	F	1 ADS Valve & 1 LPCI or 1 LPCS	5.5.2.3
3.5.3	RCIC System - Condition A	5.5.1.4.			
3.6.1.1	Primary Containment - Condition A	5.5.1.5	3.6.1.1	Primary Containment - Condition A	5.5.2.4
3.6.1.6	Low-Low Set Valves		3.6.1.6	Low-Low Set Valves	
A	One LLS Valve Inoperable	5.5.1.6	A	One LLS Valve Inoperable	5.5.2.5
3.6.1.7	Reactor Bldg. to Suppression Chamber Vacuum Breakers				
C	One Line with One or More Vacuum Breakers Inoperable for Opening.	5.5.1.7			

Table 1 (Continued)

Summary of Proposed End State Changes from Cold Shutdown (Mode 4) to Hot Shutdown (Mode 3)

BWR-4 Technical Specification			BWR-6 Technical Specification		
LCO Number	**Title**	**Basis Section**	**LCO Number**	**Title**	**Basis Section**
3.6.1.8	Suppression Chamber to Drywell Vacuum Breakers				
A	One Vacuum Breaker Inoperable for Opening.	5.5.1.8			
			3.6.1.7	RHR Containment Spray Conditions A and B	5.5.2.6
			3.6.1.8	Penetration Valve Leakage Control System - Conditions A and B	5.5.2.7
3.6.1.9	MSIV Leakage Control System - Conditions A & B	5.5.1.9	3.6.1.9	MSIV Leakage Control System - Conditions A and B	5.5.2.8
3.6.2.3	RHR Suppression Pool Cooling		3.6.2.3	RHR Suppression Pool Cooling	
A	One RHR Subsystem Inoperable	5.5.1.10	A	One RHR Subsystem Inoperable	5.5.2.9
3.6.2.4	RHR Suppression Pool Spray Conditions A & B	5.5.1.11			
3.6.4.1	Secondary Containment Condition A	5.5.1.12	3.6.4.1	Secondary Containment - Condition A	5.5.2.10
3.6.4.3	Standby Gas Treatment System - Conditions A & D	5.5.1.13	3.6.4.3	Standby Gas Treatment System - Conditions A and B	5.5.2.11
			3.6.5.6	Drywell Vacuum Relief System	
			B	One or two DW post-LOCA Vacuum Relief Subsystems Fail to Open.	5.5.2.12
			C	One DW Purge Vacuum Relief Subsystem Fails to Open.	5.5.2.12
3.7.1	RHR Service Water System				
A	One RHRSW Pump Inoperable.	5.5.1.14			

Table 1 (Continued)

Summary of Proposed End State Changes from Cold Shutdown (Mode 4) to Hot Shutdown (Mode 3)

BWR-4 Technical Specification			BWR-6 Technical Specification		
LCO Number	Title	Basis Section	LCO Number	Title	Basis Section
B	One RHRSW pump in each subsystem inoperable.	5.5.1.14			
C	One RHRSW subsystem inoperable for reasons other than Condition A.	5.5.1.14			
3.7.2	Plant Service Water System and Ultimate Heat Sink		3.7.1	Standby Service Water System and Ultimate Heat Sink	
A	One pump inoperable	5.5.1.15	A	One or more cooling towers with one cooling tower fan inoperable.	5.5.2.13
B	One pump in each subsystem inoperable	5.5.1.15	B	One SSW System inoperable for reasons other than A.	5.5.2.13
3.7.4	MCREC System - Conditions A & D	5.5.1.16	3.7.3	Control Room Fresh Air System - Conditions A and D	5.5.2.14
3.7.5	Control Room. Air Conditioning System - Conditions - A & D	5.5.1.17	3.7.4	Control Room Air Conditioning System - Conditions A and D	5.5.2.15
3.7.6	Main Condenser Offgas - Condition A	5.5.1.18	3.7.5	Main Condenser Offgas - Condition A	5.5.2.16
3.8.1	AC Sources - Operating		3.8.1	AC Sources - Operating	
A	1 Offsite Circuit inoperable	5.5.1.19	A	1 Offsite Circuit inoperable	5.5.2.17
B	1 Diesel Generator inoperable	5.5.1.19	B	1 Diesel Generator inoperable	5.5.2.17
C	2 Offsite Circuits inoperable	5.5.1.19	C	2 Offsite Circuits inoperable	5.5.2.17
D	1 Offsite circuit & 1 DG inoperable	5.5.1.19	D	1 Offsite circuit & 1 DG inoperable	5.5.2.17
E	2 DGs inoperable	5.5.1.19	E	2 DGs inoperable	5.5.2.17
F	1 Automatic Load Sequencer inoperable	5.5.1.19	F	1 Automatic Load Sequencer inop.	5.5.2.17

Table 1 (Continued)

Summary of Proposed End State Changes from Cold Shutdown (Mode 4) to Hot Shutdown (Mode 3)

BWR-4 Technical Specification			*BWR-6 Technical Specification*		
LCO Number	**Title**	**Basis Section**	**LCO Number**	**Title**	**Basis Section**
3.8.4	DC Sources - Operating A - 1 DC Electrical Power Subsystem	5.5.1.20	3.8.4	DC Sources - Operating	
			A	Div. 1 or 2 DC Electrical Power Subsystem inoperable	5.5.2.18
3.8.7	Inverters Condition A	5.5.1.21	3.8.7	Inverters Conditions A	5.5.2.19
3.8.9	Electrical Power Distribution Systems		3.8.9	Electrical Power Distribution Systems	
A	1 or More AC Distribution Systems	5.5.1.22	A	1 Div. 1 or 2 AC Distribution Subsystem inoperable	5.5.2.20
B	1 or More AC Vital Buses	5.5.1.22	B	1 Div. 1 or 2 AC Vital Buses inop.	5.5.2.20
C	1 or More DC Distribution Systems	5.5.1.22	C	1 Div. 1 or 2 DC Distribution	5.5.2.20

1.0 INTRODUCTION/BACKGROUND

During 1999, the BWR Owners' Group (BWROG) formed a committee to identify risk-informed Technical Specifications (Tech Spec) improvements. This activity was part of a NRC and Industry Joint Owners' Group program to define and implement risk-informed Tech Spec changes. Seven initiatives were identified as potential candidates for risk-informed Tech Spec improvements. The first of these initiatives concerns required actions when a Tech Spec Limiting Condition for Operation (LCO) is not met. This condition occurs when a system or component is determined to be inoperable. Normally, a time is specified to allow restoration of the system or component to an operable state. If repairs cannot be completed within the required allowable time, then the plant must ultimately be placed in cold shutdown. Based on consideration of the risk associated with taking the plant to cold shutdown and then restarting the plant after repairs are complete, the Industry felt that there may be a preferred end state different than cold shutdown. The Combustion Engineering Owners Group (CEOG) subsequently made a submittal (Reference 1) to the NRC in March 2000 that provided proposed end state improvements for CE plants. The BWROG report presented here provides similar end state improvements for BWR plants.

An evaluation was conducted using the Standard Technical Specifications for BWR-4 and BWR-6 plants (References 2 and 3, respectively). The assessment considered all Tech Spec end states resulting in a cold shutdown (Mode 4). The analysis then evaluated an alternate end state of remaining in hot shutdown (Mode 3) as a preferred alternative to Mode 4. Other potential preferred alternatives, such as low power operation, were outside the scope of this study.

The analysis followed the basic guidance for risk-informed decision-making for Licensing Basis and Tech Specs given in Regulatory Guides (RGs) 1.174 (Reference 4) and 1.177 (Reference 5). The engineering evaluation considers compliance with current regulations (Section 4.1), the general impact of the proposed changes on the defense-in-depth (Section 4.2), the general effect of the proposed changes on the safety margins (Section 4.3), and the results from the risk impact evaluation (Section 4.4). Section 4.5 summarizes the basis for each risk-informed Tech Spec proposed end state change. Section 4.6 describes the approach for licensees to evaluate the risk associated with the proposed Tech Spec changes. Appendix A describes the quality assurance related to the engineering analyses to support the proposed changes. Appendix B provides a list of participating Utilities and associated BWR plants. A summary listing of all Mode 4 end states considered in the analysis and an identification of those changed and not changed is provided in Appendix C.

2.0 BENEFITS OF PROPOSED MODIFICATIONS

There are three shutdown modes specified in BWR Technical Specifications. Hot shutdown (Mode 3) is defined as all control rods inserted and the reactor coolant temperature >200°F*. Cold shutdown (Mode 4) occurs when the reactor coolant temperature is <200°F. The remaining shutdown mode (Mode 5) is for refueling and maintenance operations with the reactor vessel head not tensioned. There are several normal operating systems and standby safety systems available during hot shutdown that are not available during cold shutdown. Therefore, staying in hot shutdown using the Condensate System for decay heat removal while repairs are being made to inoperable equipment provides more available high pressure systems, avoids challenging shutdown systems, and makes return to power less prone to operating transients.

Past experience indicates there have been many incidents involving loss of water makeup and cooling during plant shutdowns. The CEOG report (Reference 1) provides a summary of events related to shutdown operations. Experience has shown that there is a potential for personnel-induced errors during entry into shutdown cooling operations and subsequent operations. Reducing the number of entries into shutdown cooling operations reduces the number of potential personnel-induced errors.

Incorporation of the proposed changes not only enhances plant safety but also improves plant availability. Avoidance of cold shutdown entry is estimated to be similar to CE PWRs (Reference 1). These averted savings are in the order of 8 to 16 hours per event corresponding to approximately $250K - $750K of averted cost.

* Typical value. Temperature value could vary from plant to plant.

3.0 RISK-INFORMED END STATE REVIEW AND ASSESSMENT PROCESS

A risk-informed assessment was conducted using standard Technical Specifications for BWR-4 and BWR-6 plants (References 2 and 3, respectively) and consists of the following steps:

1. Initial Screening to Select Tech Spec Changes for Assessment

   The assessment started by considering all Tech Spec end states resulting in a cold shutdown (Mode 4). Normally, a time is specified to allow restoration of the system or component to an operable state. If repairs cannot be completed within the required allowable time, the plant must ultimately be placed in cold shutdown. Based on consideration of the risk associated with taking the plant to cold shutdown and then restarting the plant after repairs are complete, there may be a preferred end state different than cold shutdown.

   The initial screening to select Tech Specs with a cold shutdown (Mode 4) end state for evaluation in this project was performed by discussions with the BWROG. A summary listing of all Mode 4 end state Tech Specs evaluated and an identification of those changed and not changed is provided in Appendix C. Those Tech Specs identified in Appendix C as "No Change" are not considered further in this report.

   The following are some of the primary considerations in allowing the vessel to stay pressurized in a hot shutdown mode (Mode 3) based on existing inoperable conditions:

   - Remaining in hot shutdown is only temporary while inoperable equipment is being restored to an operable state.
   - Maintains the availability of standby steam-driven systems [High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC)].
   - Achieves primary risk reduction by reducing source term/decay heat as the result of shutting down the reactor.
   - Avoids challenging the shutdown cooling system and associated potential for personnel errors.
   - Option to go to cold shutdown is still available based on existing operating conditions.

   The following are some primary considerations for going to cold shutdown (Mode 4) based on existing inoperable conditions:

   - Primary impact of inoperable equipment results in a significant increase in Large Early Release Frequency (LERF).
   - Loss of ability to adequately control Reactor Coolant System (RCS) pressure.

- Steam-driven systems are inoperable.
- An inoperable condition which can be effectively mitigated by reducing RCS pressure.

2. Risk-Informed Assessment of Proposed Tech Spec Changes.

   The risks during the two modes of operation (Mode 3 versus Mode 4) were evaluated using the PSA for a typical BWR-4 plant. The plant-specific PSA model for full power operation was modified to reflect the core damage frequency (CDF) during Mode 3 and Mode 4 operations. This allowed a comparison of the risks between the two shutdown modes for various inoperable conditions specified in Tech Specs. For those inoperable conditions that were not explicitly modeled in the PSA because of either low risk significance or Level 2 (LERF) considerations, risk insights from existing BWR experience were used in making decisions regarding the risk impact. A more detailed discussion of the quantitative risk assessment is contained in Section 4.4.3.

3. Deterministic Considerations

   This risk-informed assessment verifies that each of the proposed end state changes complies with current regulations by maintaining adequate defense-in-depth and safety margins. The intent of the deterministic assessment is to provide risk-informed information to support a temporary change in plant design basis while inoperable equipment is being restored to an operable state. For the majority of cases, redundancy exists to perform the affected function. Where a function is lost due to inoperable equipment, adequate defense-in-depth and safety margins are demonstrated based on the inoperable function's low risk significance and offsetting benefits related to remaining in hot shutdown. The deterministic considerations are discussed further in Section 4.

4. Documentation of Risk-Informed Basis

   The final documentation of the risk-informed basis is provided in Section 4.5. The following information is summarized for each proposed Tech Spec change:

   Description

   LCO

   Condition Requiring Entry into End State

   Applicability

   Proposed Modification

   Basis for Proposed Change

   Defense-in-Depth Considerations

5. Development of Implementation and Monitoring Program

   The approach to evaluate and monitor the risks associated with the Tech Spec changes is presented in Section 4.6.

4.0 ANALYSIS RESULTS

4.1 COMPLIANCE WITH CURRENT REGULATIONS

The proposed changes presented in this report do not modify the existing design basis. Rather, the changes are related to risk-informed improvements to the required actions when a system or component is found inoperable. The modifications are consistent with the same basic principles established in Tech Specs for dealing with inoperable equipment. The existing Tech Specs allow repairs to be completed within specified completion times. If repairs cannot be completed within these allowable times, the plant must be placed in a mode where the inoperable system or component is not a factor in the plant's design basis. The proposed changes allow repair of inoperable equipment to be completed in the hot shutdown, rather than the current cold shutdown operating condition required by the Tech Specs. The hot shutdown condition (Mode 3) does not challenge the cooldown and startup systems. The proposed changes do not prevent going to cold shutdown (Mode 4) if operating conditions should so dictate. It is therefore concluded that the proposed changes to required action end states are in compliance with current licensing regulations.

4.2 CONSISTENT WITH DEFENSE-IN-DEPTH PHILOSOPHY

Implementation of the proposed end state changes will improve the defense-in-depth capability by allowing the plant to minimize unnecessary configuration changes and operate in a mode where normal operating systems for reactor water makeup and cooling and steam-driven makeup systems are available should a transient or accident occur. The plant maintains the flexibility of going to cold shutdown if the operating condition should so dictate. A more detailed discussion of defense-in-depth considerations is provided in Section 4.5.

4.3 SUFFICIENT SAFETY MARGINS MAINTAINED

Safety margins are not reduced by implementation of the proposed changes. The proposed end state changes result in a net improvement to plant safety. Plant risks are reduced by allowing plant operators the flexibility to operate in a preferred mode with normal operating systems and backup steam-driven water makeup systems available. In addition, the proposed changes allow the flexibility to complete required repairs of inoperable equipment and bring the plant back on line with minimum number of operation and configuration changes.

The plant design basis is not affected by the proposed changes. The changes are limited to those end state actions specified for Tech Spec inoperable conditions. The proposed changes were based on the condition that the changes reduce the overall risks or are risk neutral.

4.4 EVALUATION OF RISK IMPACT

To compare the risks associated with either staying in Mode 3 or going to Mode 4, qualitative as well as quantitative assessments were carried out. Based on the deterministic considerations in this section, Tech Spec items have been identified in Tables 1 and C-1 for which it is recommended that repairs be carried out in Mode 3 rather than Mode 4. Most of the equipment or systems affected by these Tech Spec items are modeled in the PSA. In those cases, a Mode 3 and Mode 4 PSA model was developed. The core damage frequencies (CDFs) associated with being in Modes 3 and 4 were evaluated. Then, for both modes, the increase in CDF associated with the specific equipment/system being unavailable was calculated. The relative CDF change provided an assessment of which mode is a safer state to be in when the equipment/system is unavailable. Certain equipment/systems are not specifically modeled in PSAs because of their relatively low contribution to plant risk. In such cases, the risk evaluation has been qualitative and not quantitative.

4.4.1 General Assumptions

The general assumptions that relate to these assessments are judged to be reasonable. More specific assumptions relative to quantitative assessments are discussed in Section 4.4.3.

The general assumptions are:

- Assessments are carried out for a generic BWR-4 plant based on representative BWR-4 plant features. The results are applicable to all BWR plants as discussed in Section 4.4.3.4 .
- The plant is assumed to be shut down to handle a specific LCO item and, consequently, it is assumed that no additional systems are unavailable due to maintenance at that time.
- RCIC, HPCI and Power Conversion System (PCS) are available in Mode 3 but not available in Mode 4.
- The Condensate System is available for water injection in Mode 4.
- There is a slight difference between what the Tech Specs call the beginning of Mode 4 and what the PSA models. The Tech Specs define Mode 4 as having started when the reactor coolant temperature reaches 200°F. However, in the PSA the start of residual heat removal (RHR) in the SDC mode is modeled as the start of Mode 4. In actual plant operations, the start of RHR in the SDC mode occurs before the reactor coolant reaches 200°F.
- The PSA models both Mode 3 and Mode 4 are for steady states.

4.4.2 Qualitative Risk Assessments

Plant risks at shutdown are conceptually similar to those that occur during power operation. However, the "shutdown" nature of the core ensures adequate reactivity control, reduces core heat addition, and generally provides more time for successful operator intervention due to the lower decay heat and lower initial stored energy. Qualitative risk comparisons between Mode 3 and Mode 4 operation are considered from the perspective of Critical Safety Functions and Risk parameters (initiating events and mitigating systems).

4.4.2.1 Reactivity Control

This control is not a concern in Modes 3 and 4, since the reactor is already shut down. It is assumed that the plant shutdown process was uneventful and all rods are inserted.

4.4.2.2 Reactor Overpressure Control

This control is not a concern in Modes 3 and 4, since the reactor is fully shut down. Pressure is usually lower than normal operating pressure, and passive relief capacity ensures that RPV pressure is maintained within safety limits.

4.4.2.3 Core Decay Heat Removal

This is also referred to as a core cooling function. The systems that can provide the core cooling function at high reactor pressure are:

- Power Conversion System (e.g., steam path through MISVs to BOP and Condensate)
- HPCI System
- RCIC System
- CRD System

While the CRD System cannot provide adequate core cooling at full power, it can be a significant contributor to core cooling in Mode 3.

The systems that can provide core cooling at low reactor pressure are:

- Low Pressure Cooling System (LPCS)
- Low Pressure Coolant Injection System (LPCI)
- Condensate System
- Control Rod Drive (CRD) System
- SW Cross-tie System
- Fire-Water System

In Mode 3 the reactor has to be depressurized before the low pressure systems can be used. The plant Emergency Operating Procedures (EOPs) require the operator to depressurize the reactor manually; however, if the operator does not depressurize in time, the Automatic Depressurization System (ADS) will be initiated automatically. Some plant full power PSA models have not taken credit for the core cooling capability of the Fire-Water System.

The following are the major differences between Modes 3 and 4:

- The steam-driven systems (HPCI and RCIC) are available in Mode 3 when the reactor is at high pressure, but are not available in Mode 4 when the reactor is depressurized.

- The PCS decay heat removal path through the steamlines to the condenser is available in Mode 3 but not in Mode 4.

Based on this qualitative comparison, it is judged that that there are more systems that can provide this function in Mode 3 than in Mode 4.

4.4.2.4 Containment Heat Removal

The following systems provide the containment heat removal capability:

Mode 3:

- PCS (e.g., steam path through MISVs to BOP and steam-driven feedwater pumps)*
- RHR in the SPC or SDC* Mode for transients
- RHR in the Containment Spray Mode for the LOCA
- Containment vent

Mode 4:

- RHR in the SPC or SDC Mode for transients
- Containment vent

Mode 3 has one more system (PCS) that can provide the containment heat removal function when compared to Mode 4.

4.4.2.5 Shutdown Initiating Events

The initiating events that could occur during Modes 3 and 4 are different from those that can occur at full power. The initiating events in Modes 3 and 4 are generally restricted to failure of normally operating systems and their support systems.

4.4.3 Quantitative Risk Assessment

This section provides a quantitative representation of the risks of core damage associated with continued operation in shutdown modes. The analysis is performed using a generic BWR-4-plant model that was developed based on a representative BWR-4 plant full power PSA model. The mitigation systems used in the representative BWR-4 plant PSA have been augmented by additional systems such as a Fire-Water System.

The scope of the evaluation was to provide a comparative quantitative assessment of the core damage risks associated with either staying in Mode 3 or going to Mode 4 to carry out equipment repair.

* In Mode 3, the PCS and also the RHR in SDC mode provide "containment heat removal capability" by removing heat from the vessel to eliminate the potential for steam relief to the suppression pool, thereby mitigating pool heatup.

4.4.3.1 Methodology

The quantification focused on estimating core damage frequency while the plant is operating in Modes 3 and 4. As discussed in the following section, it is not necessary to quantify any transition risk.

Based on deterministic considerations in Section 4.5, Tech Spec items have been identified in Tables 1 and C-1 for which it is recommended that repairs be carried out in Mode 3 rather than Mode 4. Most of the equipment or systems affected by these Tech Spec items are modeled in the PSA. In those cases, a Mode 3 and Mode 4 PSA model was developed. CDFs associated with being in Modes 3 and 4 were evaluated. Then, for both modes, the increase in CDF associated with the specific equipment/system being unavailable was calculated. The relative CDF change provided an assessment of which mode is a safer state to be in when the equipment/system is unavailable. The conclusions of the assessments are provided in Section 4.4.3.6.

The Mode 3 and 4 models were developed based on the representative BWR-4 plant full power PSA. The PSA was developed for a generic BWR-4 plant. The key steps involved were:

1. Defining a generic plant configuration.
2. Identifying the initiating events.
3. Calculating initiating event frequencies.
4. Developing success criteria for each safety function.
5. Developing accident event trees.
6. Modifying/developing system fault trees.
7. Setting up PSA code for quantification of various Tech Spec conditions.
8. Comparing Mode 3 and Mode 4 results.
9. Carrying out sensitivity studies.

Additional details for each of the steps are provided below.

Plant Configuration: The representative BWR-4 plant systems have been adopted for the generic BWR-4 plant. The representative BWR-4-plant does not credit the Fire-Water System for core cooling. However, since a number of plants have added this system to their PSA, this system has been added to the generic BWR-4 plant configuration.

The LPCS and LPCI Systems have the capability to take suction from both the suppression pool and the condensate storage tank (CST). This capability has been retained and sensitivity studies have been carried out to reflect the absence of this feature.

The containment vent capability has been retained as modeled in the representative BWR-4 full power PSA. The representative BWR-4 plant vent is not operable in a station blackout (SBO) scenario.

Initiating Events: The representative BWR-4 plant full power PSA models a number of initiating events. However, most of them are not applicable for the Mode 3 and Mode 4 PSA because the plant is already shut down while in these modes. More appropriate events for these modes are the failure of normally running frontline or support systems. The potential for large and medium LOCAs was not considered as initiating events based on the low pressures and energy levels associated with Modes 3 and 4. A small LOCA was considered possible during Mode 3. However, since the reactor is depressurized during Mode 4, a LOCA was considered unlikely, but loss of vessel inventory due to an incorrect valve lineup by the operator was considered. The following initiating events were selected:

Mode 3:

Loss of offsite power
Loss of power conversion system
Loss of service water
Small loss-of-coolant accident

Mode 4:

Loss of offsite power
Loss of one RHR SDC loop
Loss of service water
Small loss-of-coolant inventory

Initiating Event Frequencies: Initiating event frequencies were calculated based on a combination of operating experience and data from other PSAs. Sensitivity studies were conducted to ensure that the conclusions are not sensitive to the values of the initiating event frequencies that are dominant contributors to core damage.

Success Criteria: Success criteria for the various safety functions were derived from the full power PSA after accounting for the reduced decay heat levels in the shutdown modes. For instance, the CRD System was considered capable of providing adequate core cooling in Modes 3 and 4. Depressurization was considered necessary in Mode 3 to permit low-pressure injection. However, since the reactor is already depressurized in Mode 4, this function was not considered necessary. The number of safety/relief valves (SRVs) necessary to depressurize the reactor in Mode 3 is less than that needed at full power; however, it was judged that the number of SRVs was not a significant contributor to the depressurization function unavailability and Mode 3-specific success criteria were not developed.

Since the reactor was already shut down, no success criteria were needed for the reactivity control function.

Many systems are available for the core cooling function; however, the steam-driven RCIC and HPCI Systems are available only in Mode 3. The CRD System also provides core cooling at high pressure. The LPCS, LPCI, Condensate Injection, SW Cross-tie and Fire-Water Systems can provide core cooling at low pressure. In Mode 3, the Power Conversion System, if available, can provide both the core cooling and containment heat removal functions.

The RHR System can provide the containment heat removal function in both Modes 3 and 4. RHR is also available in both the SPC and SDC modes. In case of a LOCA, the containment spray mode of the RHR System can more effectively remove the heat from the containment. If the RHR System is not available, the containment vent can provide the same capability. The venting action impacts the operation of pumps taking suction from the suppression pool and this has been accounted for in the PSA model.

Accident Event Trees: New event trees were developed based on the success criteria developed for Modes 3 and 4. The trees are generally simpler than their counterparts for the full power PSA because of the absence of ATWS events in both modes and the lack of a need for depressurization in Mode 4. The dependence of core cooling systems taking suction from the suppression pool on the loss of RHR function and subsequent venting has been modeled based on the full power PSA.

System Fault Trees: Fault trees were generally taken from the full power PSA and, if required, modified to reflect the success criteria changes. New fault trees were developed for certain new systems such as the Fire-Water System which are not part of the full power PSA.

PSA Quantification: The fault trees and event trees were quantified using the CAFTA code. The representative BWR-4 plant PSA full power CAFTA code setup was modified to quantify the Mode 3 and 4 PSA models by appropriately setting up the flags that enable and disable various functions.

A base case analysis was made for Modes 3 and 4. Additional analyses were carried out for each of the LCO conditions indicated in Appendix C, which are candidates for this study. The equipment or system to be repaired was modeled as being unavailable in the PSA model, and the corresponding CDF was determined for Modes 3 and 4.

Comparison of Mode 3 and Mode 4 Results: The comparison of the Mode 3 and 4 CDF results for the base case, as well as the LCO cases, indicates whether it would be safer to stay in Mode 3 rather than go to Mode 4 to complete the repair (see Section 4.4.3.6 for details).

Sensitivity Studies: The base case Mode 3 and 4 CDF results were examined to identify the basic events and initiators that are significant contributors to the CDF. The values for these parameters are varied to determine the impact on the CDF and to determine if the conclusions are sensitive to these values.

4.4.3.2 Transition Risks

Generally, plant transitions tend to expose the plant to additional risk. These risks are typically accumulated in a short time frame. The increased risk from a plant transition arises from the impact of the plant transition on increasing plant trip and loss of power event frequencies, and by errors occurring during valve and system realignments required by some transitions. The most common transitions are from full power to shutdown modes, and these are important in making a decision as to whether to continue plant operation or shut down to repair a component. The transition risk from full power to Mode 3 is common to either option of staying in Mode 3 or moving to Mode 4 to complete the repair.

In addition to transition risk from full power to shutdown mode, transition between shutdown modes could be potentially important. During Mode 3, a number of operations are carried out as the reactor power and pressure are reduced. In a sense, the whole Mode 3 operation in a typical outage can be considered a transition because the operators are carrying out actions relating to the power conversion system and recirculation system to reduce power and pressure so as to be ready for Mode 4. At some point in Mode 3, when reactor pressure is sufficiently low, the RHR System is flushed in preparation of the Shutdown Cooling (SDC) mode of operation. In this study, it is assumed that some of the power and pressure reduction activities will still be carried out in Mode 3, and the act of engaging the RHR System in the SDC mode is the only major activity that could potentially contribute to transition risk from Mode 3 to Mode 4. Because of the very limited time involved in this transition and the low probability of drain-down when the RHR System is engaged in the SDC mode, it is judged that the transition risk from Mode 3 to Mode 4 is insignificant relative to overall Mode 3 and Mode 4 risks.

At the end of the repair, when coming back to full power, there is a potential for transition risk. This again is independent of whether the repair is conducted in Mode 3 or Mode 4.

In summary, three types of transition risks were considered in the evaluation of whether to stay in Mode 3 or go to Mode 4 to carry out the repair: (1) transition risk associated with going from full power to Mode 3; (2) transition risk from Mode 3 to Mode 4; and (3) transition risk associated with going from Mode 3 or 4 to full power. The first and third types of transition risks are common to either option of staying in Mode 3 or going to Mode 4. The second transition risk of going from Mode 3 to 4 is judged to be very small and, thus, is not factored into the study. It is therefore concluded that the transition risks are not a factor in this evaluation.

4.4.3.3 External Events

No PSA was performed to address the external events. However, as discussed below, the conclusions reached in this report, based on the internal event PSA, remain unchanged even when external events are factored in. The external events considered are seismic, fire and flood.

The probability of a seismic event occurring in either Mode 3 or Mode 4 is judged to be the same. The seismic events during Modes 3 and 4 are likely to result in an unrecoverable loss of offsite power event. The seismic event is more likely to disable the Condensate and Fire-Water Systems than the ECCS. Since the RCIC and HPCI Systems, which are designed for seismic loads, are available in Mode 3 and not in Mode 4, the plant's ability to prevent core damage is higher in Mode 3 than in Mode 4.

Internal flood and internal fire events are generally more likely to occur during Mode 4 because of increased maintenance activities and presence of transient combustible material in Mode 4. In each case, the flood or the fire can potentially disable the equipment in the affected fire and flood zone. It is judged that the impact of having one or more systems unavailable following a fire or a flood will be greater on the Mode 4 results than the Mode 3 PSA results, since more systems are available in Mode 3. The consideration of fire and flood is more likely to favor staying in Mode 3, during which additional core cooling systems are available.

It is therefore concluded that the recommendations of the report remain unchanged when seismic events are considered. Considerations of flood and fire events are likely to favor staying in Mode 3.

4.4.3.4 Sensitivity Studies

Sensitivity studies were performed to evaluate if the conclusions change when some of the key PSA input data are varied. In addition, capabilities of certain systems were varied to simulate other BWR plants, which vary from the base model.

Specifically, the following PSA input data were changed:

Initiating Event Frequency:

Mode 3: Loss of Service Water
Mode 3: Loss of Offsite Power
Mode 4: Loss of One RHR SDC Loop
Mode 4: Loss of Service Water
Mode 4: Loss of Offsite Power

Basic Event Failure Probability:

Modes 3 & 4: Primary Containment Vent Valves
Diesel Generator Common Cause Failure
Recovery of Offsite Power

System Capability:

Fire-Water System (ability to provide core cooling)
CRD System (ability to provide core cooling)
LPCS (ability to take suction from condensate storage tank)
LPCI (ability to take suction from condensate storage tank)

The results of the sensitivity studies are discussed below:

- Sensitivity studies of initiating event frequencies were not performed, since the factor increase in both modes is the same.
- A factor of 10 increase in the basic event probabilities of significant contributors to CDF increased the Mode 3 and Mode 4 CDF by similar amounts. It was concluded that the various PSA Mode 3 and Mode 4 PSA cases that were run to simulate staying in Modes 3 and 4 were affected similarly. Therefore, the conclusions of the study remained unchanged and are insensitive to the basic event probability values.
- The PSA cases were reanalyzed without taking credit for the Fire-Water and CRD Systems and part of the LPCS and LPCI Systems noted earlier. The results were found to be insensitive to these systems and features.

The results of the analysis are extended to other BWR product lines. The impact of major differences between BWR-4 and other product lines on Mode 3 and 4 results are discussed below:

Some BWR-2, 3 plants are equipped with Isolation Condensers instead of RCIC. Following an isolation transient, Isolation Condensers condense the main steam and return it to the reactor. Isolation Condensers do not require any motive power for pumping. Just like RCIC, Isolation Condensers are also capable of mitigating station blackout events in Mode 3. Both Isolation Condenser and RCIC have similar system reliability and therefore their contributions to mode 3 results are very similar. Neither system is available during Mode 4 and so the Mode 4 results are not impacted by the two systems. One difference between RCIC and Isolation Condenser is that in Mode 3, RCIC can mitigate small LOCA while Isolation Condenser cannot. However, small LOCA's are insignificant contributors to Mode 3 and 4 core damage frequency and this difference between RCIC and Isolation Condenser is considered negligible.

BWR-2 plants are equipped with eight core spray pumps (in two loops) with two pumps needed for successful core cooling. The generic BWR-4 plant model includes two core spray pumps in two loops and four LPCI pumps with any one pump being sufficient to provide successful core cooling. Because both BWR-2 and BWR-4 plants have many low pressure cooling systems, this difference in number of pumps is not considered significant. (Most BWR plants are equipped with LPCI, LPCS, Condensate, SW cross-tie and Fire-Water injection systems for low pressure core cooling).

Certain BWR-4 plants are equipped with four core spray pumps in two loops with two pumps in a loop needed for successful core cooling. The generic BWR-4 plant model includes two core spray pumps in two loops with one pump in a loop required for successful core cooling. Because both BWR-2 and BWR-4 plants have many low pressure cooling systems, this difference in number of pumps is not considered significant.

BWR-5 and -6 plants have a motor-driven (High Pressure Core Spray) HPCS system instead of the steam-driven HPCI system. Both systems can provide core cooling at high reactor pressure. Because HPCI is steam-driven, it can function following a station blackout event. However, HPCS too can function following a station blackout event since HPCS is powered by an independent power source (diesel generator). HPCS and HPCI have similar system reliability and therefore their contributions to mode 3 results are very similar. HPCI is not available during Mode 4, but HPCS can be available. However, since BWRs have many core cooling systems available during Mode 4, the contribution of one additional system (HPCS) is considered to be negligible. Overall, even with HPCS available, it is still better to stay in Mode 3 than going to Mode 4 because of the availability of RCIC. The conclusions reached for the BWR-4 plant are still applicable for the BWR-5 and -6 plants.

The conclusions of the study are therefore judged to be insensitive to the key input values and certain differences in available mitigating systems among the BWR plants. Because of differences in mitigation systems, plant-specific evaluations should be used to confirm these generic judgments.

4.4.3.5 LERF

The quantitative assessment did not calculate or compare Large Early Release Frequency (LERF) for several reasons. During full power operation (Mode 1), the large early radioactive releases are a result of (1) energetic containment failure due to a high pressure core melt, (2) a containment bypass event and (3) a core damage event occurring in combination with an unisolated containment. The likelihood of a large early release in Modes 3 and 4 is very low. This is due to the combined impact of the lower initial energy level, reduced fission product inventory level and decay heat load compared to full power. These factors serve to provide time for the operator to respond to serious plant upsets and, consequently, contribute to delaying the core melt progression and reducing radiation releases.

4.4.3.6 Summary of Quantitative Analysis

In the quantitative assessment base case, CDF was evaluated for both Modes 3 and 4 assuming all systems were available. Then, for each mode, the system/equipment identified in Table C-1 were assumed to be unavailable, one at a time, and CDF was recalculated. Transition risks were not evaluated, since the only transition risk applicable to this study was the one from Mode 3 to Mode 4, which was judged to be insignificant (Section 4.4.3.2). External risks are not a factor, based on the discussion in Section 4.4.3.3 and LERF is not evaluated, based on Section 4.4.3.5.

The base case CDF results for Modes 3 and 4 are very low and essentially identical. With the equipment/system taken out of service (e.g., the RHR System, Diesel Generators and Service Water System disabled), the Mode 4 CDF is significantly higher than the corresponding Mode 3 value. In the remaining cases, the Mode 4 CDFs essentially remain the same as the corresponding Mode 3 values.

It is therefore concluded that, based on the quantitative analysis, in certain cases it is safer to stay in Mode 3 than to move to Mode 4 to carry out the repairs. For the remaining cases, staying in Mode 3 has no adverse effect on plant risk. Based on a review of the differences among the various BWR product lines, the conclusions are extended to all the BWR models.

4.5 INDIVIDUAL TECHNICAL SPECIFICATION ASSESSMENTS

This section provides a summary of the basis for each of the risk-informed Tech Spec end state changes proposed. The format of each of the subsequent subsections is as follows:

Description

LCO

Condition Requiring Entry into End State

Applicability

Proposed Modification

Basis for Proposed Change

Defense-in-Depth Considerations

This section provides an integrated discussion of the risk and deterministic issues, focusing on specific technical specifications. In performing these assessments, it is assumed that the required Mode 3 end state entry is to complete a short duration repair of inoperable equipment so that the plant may be returned to service without incurring additional risks and costs associated with establishing a cold shutdown condition. The risk justification for Mode 3 end state entry is based on the qualitative and quantitative analyses presented in Section 4.4.

4.5.1 BWR-4 End State Assessments

4.5.1.1 LCO 3.3.8.2 - Reactor Protection System (RPS) Electric Power Monitoring

Description

This Tech Spec provides operability requirements for the RPS electronic power monitoring assemblies. If one or both inservice power supplies with one electric power monitoring assemblies is inoperable, the associated inservice power supply(s) must be removed from service within 72 hours (Condition A.). In addition, if one or both inservice power supplies has both electric power monitoring assembly inoperable, the associated inservice power supply(s) must be removed from service within one hour (Condition B.). If the inservice power supply(s) cannot be removed from service within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow repair of the inoperable equipment to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than in Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two RPS electric power monitoring assemblies shall be operable for each inservice RPS motor generator set or alternate power supply.

Condition Requiring Entry into End State

If the LCO cannot be met, the associated inservice power supply(s) must be removed from service within 72 hours for one electric power monitoring (EPM) assembly inoperable or one hour for both EPM assemblies inoperable. If the inservice power supply(s) cannot be removed from service within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action C.2.

Basis for Proposed Change

The specific failure condition of interest is not risk significant in BWR PSAs. If the required restoration actions cannot be completed within the specified time, going to Mode 4 would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low probability of an accident, low probability of a condition that could cause equipment damage, and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the inoperable equipment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The function of the RPS Electric Power Monitoring System is to isolate the RPS bus from the motor generator set or an alternate power supply in the event of overvoltage, undervoltage, or underfrequency. To reach Mode 3 per the Tech Specs, there must be a functioning power supply with degraded protective circuitry in operation. However, as discussed in the Tech Spec basis, the overvoltage, undervoltage, or underfrequency condition must persist for an extended time period to cause damage. There is a low probability of this occurring in the short period of time that the plant will remain in Mode 3 without this protection.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided that sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.2 LCO 3.4.3 - Safety/Relief Valves (SRVs)

Description

This Tech Spec provides operability requirements for the safety function of the safety/relief valves (SRVs). If one or two required SRVs are inoperable, the inoperable SRV(s) must be returned to operability within 14 days (Condition A.). If the SRV(s) cannot be returned to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow repair of the inoperable SRV(s) to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than in Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The safety function of 11 SRVs shall be operable.

Condition Requiring Entry into End State

If the LCO cannot be met with one or two SRVs inoperable, the inoperable valve(s) must be returned to operability within 14 days (Condition A.). If the SRV(s) cannot be returned to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action B.2 and add Condition C. with Required Actions C.1 and C.2 to address three or more required SRVs inoperable.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in Mode 3 (assuming the individual failure conditions) are lower or comparable to the current end state. The specific failure condition of interest is not risk significant in BWR PSAs. Going to Mode 4 for one or two inoperable SRVs would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low probability of loss of the necessary overpressure protection function and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth-Considerations

The proposed change allows repairs of the inoperable SRV(s) to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The purpose of the SRV Tech Spec is to ensure that the plant is protected against severe overpressurization events. The low power level during Mode 3 makes the potential for an overpressure event remote. In addition, with one or two SRVs inoperable, the remaining operable SRVs are capable of providing the necessary overpressure protection. Because of additional design margin, the ASME Code limits for the Reactor Coolant Pressure Boundary (RCPB) can also be satisfied with two SRVs inoperable.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.3 LCO 3.5.1 - ECCS System (Operating)

Description

This set of ECCS Tech Specs provides operability requirements for the various ECCS subsystems. This Tech Spec requires that each ECCS injection/spray subsystem and the Automatic Depressurization System (ADS) function of seven SRVs) are operable. If a subsystem is inoperable, it must be restored to operable status within a specified period of time. Depending on the combination of inoperable subsystems, if restoration to operable status cannot be made within the allotted time, the plant must be placed in Mode 3 within 12 hours and one of the following actions must be effected:

- The plant must be placed in Mode 4 within 36 hours.
- Reactor steam dome pressure must be reduced to ≤150 psig within 36 hours.

The particular change sought in this Tech Spec is to remove the above-mentioned secondary actions (i.e., keep the plant in Mode 3 until the required repair actions are completed without reducing reactor steam dome pressure to ≤150 psig). These changes would allow repairs of inoperable ECCS subsytems to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than in Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Each ECCS injection/spray subsystem and the ADS function of seven SRVs shall be operable.

Conditions Requiring Entry into End State

If the LCO cannot be met, the following actions must be taken for the listed conditions:

- If one low pressure ECCS injection/spray subsystem is inoperable, the subsystem must be restored to operable status within seven days.
- If the required action associated with Condition A. cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.
- If the HPCI System is inoperable, the RCIC System must be verified to be operable by administrative means within one hour and the HPCI System restored to operable status within 14 days.

- If the HPCI System is inoperable and one low pressure ECCS injection/spray subsystem is inoperable, the HPCI System must be restored to operable status within 72 hours or the low pressure ECCS injection/spray subsystem must be restored to operable status with 72 hours.
- If one ADS valve is inoperable, the ADS valve must be restored to operable status within 14 days.
- If one ADS valve is inoperable and one low pressure ECCS injection/spray subsystem is inoperable, the ADS valve must be restored to operable status within 72 hours or the low pressure ECCS injection/spray subsystem must be restored to operable status within 72 hours.
- If the required action(s) from Conditions C., D., E., or F. cannot be met, the plant must be placed in Mode 3 within 12 hours and the reactor steam dome pressure reduced to ≤150 psig within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modifications

Delete Required Action B.2. Renumber Condition H. (and Required Action H.1) to Condition I (and Required Action I.1). Renumber Condition G. (and Required Actions G.1 and G.2) to Condition H. (and Required Actions H.1 and H.2) and remove the "OR" condition. Add a new Condition G. that is similar to the existing Condition G. but with the first condition ("Two or more ADS valves inoperable") deleted and Required Action G.2 deleted.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in the proposed Mode 3 (assuming the individual failure conditions) are lower or comparable to the current end state. Going to Mode 4 for the specified inoperable conditions would cause loss of both high pressure steam injection systems (HPCI and RCIC), loss of the feedwater/condensate system, and require activating the RHR Shutdown Cooling System. In addition, maintaining the reactor steam dome pressure above 150 psig preserves the availability of the high pressure systems. It is concluded that, based on these lower or equivalent calculated risks, staying in Mode 3 to restore systems back to service is the preferred end state rather than going to Mode 4 or a mode where reactor pressure is ≤150 psig.

Defense-in-Depth Considerations

The proposed change allows repairs of inoperable ECCS systems to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, either steam-driven HPCI or RCIC System is available for water makeup. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

The following systems are available in Mode 3 to maintain core cooling given specified inoperable subsystems for the most likely accident sequences in the PSA:

- If one low pressure ECCS injection/spray subsystem is inoperable during normal operation, the feedwater/condensate system is the primary cooling source. In addition, the two high pressure steam-driven injection systems are available for reactor water makeup should this system fail. If the high pressure systems should fail, the reactor can be depressurized and the remaining operable low pressure ECCS injection/spray subsystems can be brought on line.
- If the HPCI System and one low pressure ECCS injection/spray subsystem are inoperable during normal operation, the feedwater/condensate system is the primary cooling source. In addition, should this system fail, the high pressure steam-driven injection RCIC System is available for reactor water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. If the RCIC System should fail, the reactor can be depressurized and the remaining operable low pressure ECCS injection/spray subsystems can be brought on line.
- If one ADS valve is inoperable and one low pressure ECCS injection/spray subsystem is inoperable during normal operation, the feedwater/condensate system is the primary cooling source. In addition, the two high pressure steam-driven injection systems are available for reactor water makeup should this system fail. If the high pressure systems should fail, the EPGs and EOPs direct the operator to take control of the depressurization with the remaining operable SRVs and the remaining operable low pressure ECCS injection/spray subsystems can be brought on line.

4.5.1.4 LCO 3.5.3 - RCIC System

Description

This Tech Spec provides operability requirements for the RCIC System. If the RCIC System is inoperable, the HPCI System must be verified operable within one hour and the RCIC System must be restored to operable status within 14 days (Condition A.). If either or both of the required actions cannot be completed within the allotted time, the plant must be placed in Mode 3 within 12 hours and the reactor steam dome pressure must be reduced to ≤150 psig within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed without reducing reactor steam dome pressure to ≤150 psig. This change would allow repair of the inoperable RCIC System to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than in Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The RCIC System shall be operable.

Condition Requiring Entry into End State

If the LCO cannot be met, the following actions must be taken:

- Verify by administrative means that the HPCI System is operable within one hour.
- Restore the RCIC System to operable status within 14 days.

If either or both of the required actions cannot be met, the plant must be placed into Mode 3 within 12 hours and the reactor steam dome pressure reduced to ≤150 psig within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action B.2.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in Mode 3 with reactor steam dome pressure above 150 psig, assuming the individual failure conditions, are lower or comparable to the current end state. Reducing steam dome pressure for this inoperable condition would cause loss of HPCI and loss of the Power Conversion System (condensate/feedwater system). It is concluded that, based on these lower or equivalent calculated risks, staying in Mode 3 and maintaining reactor steam dome pressure above 150 psig to restore systems back to service is the preferred end state rather than going to a mode where reactor pressure is ≤150 psig.

Defense-in-Depth Considerations

The proposed change allows the equipment to be repaired in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The function of the RCIC System is to respond to transient events by providing makeup coolant to the reactor. No credit is taken in the safety analyses for RCIC System operation.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI System is available for water makeup. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.5 LCO 3.6.1.1 Primary Containment

Description

This Tech Spec provides operability requirements for the primary containment. If the primary containment is inoperable, it must be returned to operability within one hour (Condition A.). If primary containment cannot be returned to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow repair of the equipment to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than in Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The primary containment shall be operable.

Condition Requiring Entry into End State

If the LCO cannot be met, the primary containment must be returned to operability within one hour (Condition A.). If the primary containment cannot be returned to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action B.2.

Basis for Proposed Change

This LCO entry condition does not include gross leakage through an unisolated release path or containment rupture. Previous generic PRA work related to Appendix J requirements has shown that containment leakage is not risk significant. Going to Mode 4 for leakage in the primary containment would cause loss of both high pressure steam-driven injection systems (HPCI and LPCI), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low probability of an accident and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the primary containment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The function of the primary containment is to isolate and contain fission products released from the Reactor Pressure System following a Design Basis Accident (DBA). The DBA that postulates the maximum release of radioactive material within primary containment is a loss-of-coolant accident (LOCA). The probability of a LOCA is reduced due to the short amount of time in Mode 3. In addition, for this event, the Standby Gas Treatment System (SGTS) would be available to filter fission products prior to their release to the environment.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.6 LCO 3.6.1.6 - Low-Low Set (LLS) Valves

Description

This Tech Spec provides operability requirements for the LLS function of four safety/relief valves. If one LLS valve is inoperable, it must be returned to operability within 14 days (Condition A.). If the LLS valve cannot be returned to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow repair of the equipment to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than in Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The LLS function of four safety/relief valves shall be operable.

Condition Requiring Entry into End State

If the LCO for one LLS valve cannot be met, the valve must be returned to operability within 14 days (Condition A.). If the LLS valve cannot be returned to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action B.2 and add Condition C. with Required Actions C.1 and C.2 to address two or more LLS valves inoperable.

Basis for Proposed Change

The specific failure condition of interest is not risk significant in BWR PSAs. With one LLS valve inoperable, the remaining operable LLS valves are adequate to perform the desired function. Going to Mode 4 for this inoperable condition would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low risk significance and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the LLS valve to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The purpose of the LLS function is to prevent excessive short duration SRV cycling during an overpressure event. With the loss of one LLS valve, the designed safety function can be performed with the remaining operable LLS valves.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.7 LCO 3.6.1.7 - Reactor Building-to-Suppression Chamber Vacuum Breakers

Description

This Tech Spec provides operability requirements for the reactor building-to-suppression chamber vacuum breakers. The safety function of interest is having one line with one or more reactor building-to-suppression chamber vacuum breakers inoperable for opening (Condition C). In this case, the subject vacuum breaker(s) must be restored to operable status within 72 hours. If the vacuum breaker cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than in Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Each reactor building-to-suppression chamber vacuum breaker shall be operable.

Condition Requiring Entry into End State

If one line has one or more reactor building-to-suppression chamber vacuum breakers inoperable for opening, the breaker(s) must be returned to operability within 72 hours (Condition C). If the vacuum breaker(s) cannot be returned to operability within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Modify Condition E. to relate only to Condition C. and delete Required Action E.2. Add Condition F. with Required Actions F.1 and F.2 to address the required actions related to Conditions A., B., and D.

Basis for Proposed Change

The specific failure condition of interest is not risk significant in BWR PSAs. If one line has one or both breakers inoperable for opening, the remaining breakers in the remaining lines can provide the opening function. Going to Mode 4 for the specified inoperable condition would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low probability of an event requiring the safety function and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows vacuum breakers to be repaired in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The function of the reactor building-to-suppression chamber vacuum breakers is to relieve vacuum when the primary containment depressurizes below reactor building pressure. For the specific failure condition of interest, the remaining operable vacuum breakers are capable of providing the vacuum relief function. In addition, there is a low probability of an event occurring that would require operation of the vacuum breakers during the short period of time that the plant would remain in Mode 3.

The proposed mode also allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.8 LCO 3.6.1.8 - Suppression Chamber-to-Drywell Vacuum Breakers

Description

This Tech Spec provides operability requirements for the nine* required suppression chamber-to-drywell vacuum breakers. The safety function of interest is having one suppression chamber-to-drywell vacuum breaker inoperable for opening (Condition A.). In this case, the subject vacuum breaker must be restored to operable status within 72 hours. If the vacuum breaker cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow repair of the equipment to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than in Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Nine suppression chamber-to-drywell vacuum breakers shall be operable for opening.

Condition Requiring Entry into End State

If one suppression chamber-to-drywell vacuum breaker is inoperable for opening, the breaker must be returned to operability within 72 hours (Condition A.). If the vacuum breaker cannot be returned to operability within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action C.2 and add Condition D. with Required Actions D.1 and D.2 to address Condition B.

Basis for Proposed Change

The specific failure condition of interest is not risk significant in BWR PSAs. With one vacuum breaker inoperable for opening, the remaining operable vacuum breakers can provide the vacuum relief function. Going to Mode 4 for this inoperable condition would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low probability of an event requiring the safety function and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the vacuum breaker to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown

* Number of breakers could vary from plant to plant.

systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The function of the suppression chamber-to-drywell vacuum breakers is to relieve vacuum in the drywell. The remaining operable vacuum breakers are capable of providing the vacuum relief function. In addition, there is a low probability of an event occurring that would require operation of the vacuum breakers during the short period of time that the plant would remain in Mode 3.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.9 LCO 3.6.1.9 - Main Steam Isolation Valve (MSIV) Leakage Control System (LCS)

Description

This Tech Spec provides operability requirements for the MSIV LCS subsystems. If one MSIV LCS subsystem is inoperable, it must be restored to operable status within 30 days (Condition A.). If both MSIV LCS subsystems are inoperable, one of the MSIV LCS subsystems must be restored to operable status within seven days (Condition B.). If the MSIV LCS subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow the subsystem to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than in Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two MSIV LCS subsystems shall be operable.

Condition Requiring Entry into End State

If one MSIV LCS subsystem is inoperable, it must be restored to operable status within 30 days (Condition A.). If both MSIV LCS subsystems are inoperable, one of the MSIV LCS subsystems must be restored to operable status within seven days (Condition B.). If the MSIV LCS subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action C.2.

Basis for Proposed Change

This system is not significant in BWR PSAs and, based on a BWROG program, many plants have eliminated the system altogether. Going to Mode 4 for the specified inoperable conditions would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low risk significance and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the MSIV LCS subsystem to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The MSIV LCS supplements the isolation function of the MSIVs by processing the fission products that could leak through the closed MSIVs after a LOCA. The probability of a LOCA is reduced due to the short amount of time in Mode 3. In addition, for this event, the SGTS would be available to filter fission products prior to their release to the environment.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.10 LCO 3.6.2.3 - Residual Heat Removal (RHR) Suppression Pool Cooling

Description

This Tech Spec provides operability requirements for the Residual Heat Removal (RHR) Suppression Pool Cooling. If one RHR suppression pool cooling subsystem is inoperable, it must be restored to operable status within seven days (Condition A.). If the required action cannot be completed within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than in Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two RHR suppression pool cooling subsystems shall be operable.

Condition Requiring Entry into End State

If one RHR suppression pool cooling subsystem is inoperable, it must be restored to operable status within seven days (Condition A.). If the required action cannot be completed within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action B.2 and add Condition C. with Required Actions C.1 and C.2 to address two RHR suppression pool cooling subsystems inoperable.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in Mode 3 (assuming the individual failure conditions) are lower or comparable to the current end state. Going to Mode 4 for this inoperable condition would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the equipment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The RHR Suppression Pool Cooling System is designed to remove heat from the suppression pool following a Design Basis Accident (DBA). The probability of a DBA is reduced due to the short amount of time in Mode 3. In addition, one loop of the RHR Suppression Pool Cooling System is sufficient to perform this safety function.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.11 LCO 3.6.2.4 - Residual Heat Removal (RHR) Suppression Pool Spray

Description

This Tech Spec provides operability requirements for the Residual Heat Removal (RHR) suppression pool spray. If one RHR Suppression Pool Spray Subsystem is inoperable, it must be restored to operable status within seven days (Condition A.). If both RHR Suppression Pool Spray Subsystems are inoperable, one of them must be restored to operable status within eight hours (Condition B.). If the RHR Suppression Pool Spray Subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The change sought in this Tech Spec is to keep the plant in Mode 3 until required repair actions are completed. This change would allow repair of the subsystem to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two RHR suppression pool spray subsystems shall be operable.

Condition Requiring Entry into End State

If one RHR Suppression Pool Spray Subystem is inoperable, it must be restored to operable status within seven days (Condition A.). If both RHR Suppression Pool Spray Subsystems are inoperable, one of them must be restored to operable status within eight hours (Condition B.). If the RHR Suppression Pool Spray Subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action C.2.

Basis for Proposed Change

Failure of these subsystems is not risk significant in most BWR PSAs. Going to Mode 4 for the specified inoperable conditions would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low probability of an event requiring the safety function, availability of alternate methods to remove heat from primary containment, and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows the RHR Suppression Pool Spray Subsystem to be repaired in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

Following a Design Basis Accident (DBA), the RHR Suppression Pool Spray Subsystem removes heat from the suppression chamber airspace. A minimum of one RHR Suppression Pool Spray Subsystem is required to mitigate potential bypass leakage paths and maintain the primary containment peak pressure below the design limits. The probability of a DBA is reduced and alternate methods (e.g., containment vent) to remove heat from primary containment are available during the short period of time that the plant is in Mode 3.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.12 LCO 3.6.4.1 - Secondary Containment

Description

This Tech Spec provides operability requirements for the secondary containment. If the secondary containment is inoperable, it must be restored to operable status within four hours (Condition A.). If the secondary containment cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The change sought in this Tech Spec is to keep the plant in Mode 3 until required repair actions are completed. This change would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The secondary containment shall be operable.

Condition Requiring Entry into End State

If the secondary containment is inoperable, it must be restored to operable status within four hours (Condition A.). If it cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action B.2.

Basis for Proposed Change

This LCO entry condition does not include gross leakage through an unisolated release path or secondary containment rupture. Previous generic PSA work related to Appendix J requirements has shown that containment leakage is not risk significant. Going to Mode 4 for leakage in the secondary containment would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low probability of an accident and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the secondary containment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

Following a Design Basis Accident (DBA), the function of the secondary containment is to contain, dilute, and hold up fission products that may leak from primary containment. The probability of a DBA is reduced due to the short amount of time in Mode 3.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.13 LCO 3.6.4.3 - Standby Gas Treatment (SGT) System

Description

This Tech Spec provides operability requirements for the Standby Gas Treatment System (SGTS). If one SGTS subsystem is inoperable, it must be restored to operable status within seven days (Condition A.). If the SGTS Subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours. In addition, if two SGTS subsystems are inoperable in Mode 1, 2, or 3, LCO 3.0.3 must be entered immediately (Condition D.).

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed without entering LCO 3.0.3. This change would allow the subsystem(s) to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two SGTS subsystems shall be operable.

Condition Requiring Entry into End State

If one SGTS subsystem is inoperable, it must be restored to operable status within seven days (Condition A.). If the SGTS subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours. In addition, if two SGTS subsystems are inoperable in Mode 1, 2, or 3, LCO 3.0.3 must be entered immediately (Condition D.).

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action B.2. Change Required Action D.1 to "Be in Mode 3" with a Completion Time of "12 hours."

Basis for Proposed Change

Failure in the SGTS subsystem(s) is not risk significant in most BWR PSAs. Going to Mode 4 for the specified inoperable conditions would cause loss of both high-pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low risk significance and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the subsystem(s) to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The function of the SGTS is to ensure that radioactive materials that leak from the primary containment into the secondary containment following a Design Basis Accident (DBA) are filtered and adsorbed prior to exhausting to the environment. The probability of a DBA is reduced due to the short amount of time in Mode 3.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.14 LCO 3.7.1 - Residual Heat Removal Service Water (RHRSW) System

Description

This Tech Spec provides operability requirements for the Residual Heat Removal Service Water (RHRSW) System. If one RHRSW pump is inoperable, it must be restored to operable status within 30 days (Condition A.). If one RHRSW pump in each subsystem is inoperable, one RHRSW pump must be restored to operable status within seven days (Condition B.). If one RHRSW subsystem is inoperable for reasons other than an inoperable pump, it must be restored to operable status within seven days (Condition C.). If the required actions cannot be completed within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow repair of the equipment to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two RHRSW subsystems shall be operable.

Conditions Requiring Entry into End State

If the LCO cannot be met, the following actions must be taken for the listed conditions:

- If one RHRSW pump is inoperable, it must be restored to operable status within 30 days.
- If one RHRSW pump in each subsystem is inoperable, one RHRSW pump must be restored to operable status within seven days.
- If one RHRSW subsystem is inoperable for reasons other than Condition A., the RHRSW subsystem must be restored to operable status within seven days.
- If the required action and associated completion time cannot be met within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Renumber Conditions D. (and Required Action D.1) and E. (and Required Actions E.1 and E.2) to Conditions E. (and Required Action E.1) and F. (and Required Actions F.1 and F.2), respectively. Modify new Condition F. to address new Condition E. Add a new Condition D., which addresses Conditions A., B., and C., that is similar to the existing Condition E. but without Required Action E.2.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in Mode 3 (assuming the individual failure conditions) are lower or comparable to the current end state. Going to Mode 4 for the specified inoperable conditions would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the equipment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The RHRSW System is designed to provide cooling water for the RHR System heat exchangers, which are required for safe shutdown following a Design Basis Accident (DBA) or transient. The probability of a DBA or transient requiring safe shutdown is reduced due to the short amount of time in Mode 3. In addition, redundant components in the RHRSW System remain available, which are sufficient to perform this safety function.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.15 LCO 3.7.2 - Plant Service Water (PSW) System and Ultimate Heat Sink (UHS)

Description

This Tech Spec provides operability requirements for the Plant Service Water (PSW) System and Ultimate Heat Sink (UHS). If one PSW pump is inoperable, it must be restored to operable status within 30 days (Condition A.). If one PSW pump in each subsystem is inoperable, one PSW pump must be restored to operable status within seven days (Condition B.). If the PSW pump cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. Also, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two PSW subsystems and UHS shall be operable.

Conditions Requiring Entry into End State

If the LCO cannot be met, the following actions must be taken for the listed conditions:

- If one PSW pump is inoperable, it must be restored to operable status within 30 days.
- If one PSW pump in each subsystem is inoperable, one PSW pump must be restored to operable status within seven days.
- If the required action and associated completion time cannot be met within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action E.2 and add Condition F. with Required Actions F.1 and F.2 to address the remaining portion of Condition E.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in Mode 3 (assuming the individual failure conditions) are lower or comparable to the current end state. Going to Mode 4 for the specified inoperable conditions would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the availability of the remaining PSW pumps to perform the heat removal function and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the equipment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The PSW System is designed to provide cooling water for the removal of heat from certain safe shutdown-related equipment exchangers following a Design Basis Accident (DBA) or transient. With one pump inoperable in one or more subsystems, the remaining pumps are adequate to perform the PSW heat removal function. The probability of a DBA or transient requiring safe shutdown is reduced due to the short amount of time in Mode 3.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.16 LCO 3.7.4 - Main Control Room Environmental Control (MCREC) System

Description

This Tech Spec provides operability requirements for the Main Control Room Environmental Control (MCREC) System. If one MCREC subsystem is inoperable, it must be restored to operable status within seven days (Condition A.). If the MCREC subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours. If two MCREC subsystems are inoperable in Mode 1, 2, or 3, LCO 3.0.3 must be entered immediately (Condition D.).

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed without entering LCO 3.0.3. This change would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two MCREC subsystems shall be operable.

Condition Requiring Entry into End State

If one MCREC subsystem is inoperable, it must be restored to operable status within seven days. If the MCREC subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours. If two MCREC subsystems are inoperable in Mode 1, 2, or 3, LCO 3.0.3 must be entered immediately (Condition D.).

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action B.2. Change Required Action D.1 to "Be in Mode 3" with a Completion Time of "12 hours."

Basis for Proposed Change

Failure in the MCREC subsystem(s) is not risk significant in most BWR PSAs. Going to Mode 4 for the specified inoperable conditions would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low risk significance and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the equipment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The MCREC System provides a radiologically controlled environment from which the plant can be safely operated following a Design Basis Accident (DBA). The probability of a DBA is reduced due to the short amount of time in Mode 3. In addition, for Condition A (i.e., one

MCREC subsystem inoperable), sufficient redundant components in the MCREC System remain available to perform this safety function.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.17 LCO 3.7.5 - Control Room Air Conditioning (AC) System

Description

This Tech Spec provides operability requirements for the control room AC System. If one control room AC subsystem is inoperable, it must be restored to operable status within 30 days (Condition A.). If the control room AC subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours. If two control room AC subsystems are inoperable, LCO 3.0.3 must be entered immediately (Condition D.).

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed without entering LCO 3.0.3. This change would allow repair of the equipment to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two control room AC Subsystems shall be operable.

Condition Requiring Entry into End State

If one control room AC subsystem is inoperable, the subsystem must be restored to operable status within 30 days (Condition A.). If the required actions and associated completion times cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours. If two control room AC subsystems are inoperable, LCO 3.0.3 must be entered immediately (Condition D.).

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action B.2. Change Required Action D.1 to "Be in Mode 3" with a Completion Time of "12 hours."

Basis for Proposed Change

Failure in the control room AC Subsystems is not risk significant in most BWR PSAs. Going to Mode 4 for the specified inoperable conditions would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low risk significance and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the equipment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The Control Room AC System provides temperature control for the control room following isolation of the control room. The probability of control room isolation being required is reduced due to the short amount of time in Mode 3. In addition, for Condition A (i.e., one control room AC subsystem inoperable), sufficient redundant components in the Control Room AC System remain available to perform this safety function.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.18 LCO 3.7.6 - Main Condenser Offgas

Description

This Tech Spec provides operability requirements for the main condenser offgas. If the gross gamma activity rate of the noble gases in the main condenser offgas is not within limits, it must be restored to within limits within 72 hours (Condition A.). If the required action and associated completion time cannot be met, one of the following must occur:

- All steam lines must be isolated.
- The steam jet air ejectors (SJAE) must be isolated.
- The plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to remove the requirement to place the plant in Mode 4. This change would allow repair of the equipment to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The gross gamma activity rate of the noble gases measured at the main condenser evacuation system pretreatment monitor station shall be ≤240 mCi/second after decay of 30 minutes.

Condition Requiring Entry into End State

If the gross gamma activity rate of the noble gases in the main condenser offgas is not within limits, the gross gamma activity rate of the noble gases in the main condenser offgas must be restored to within limits within 72 hours (Condition A.). If the required action and associated completion time cannot be met, one of the following must occur:

- All steam lines must be isolated.
- The steam jet air ejectors (SJAE) must be isolated.
- The plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action B.3.2.

Basis for Proposed Change

Failure to maintain the gross gamma activity rate of the noble gases in the main condenser offgas within limits is not risk significant in most BWR PSAs. Going to Mode 4 for this inoperable condition would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low risk significance and number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows resolving the cause of the elevated gross gamma activity rate to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

While in Mode 3, the mechanical vacuum pump would assist in maintaining the availability of the Feedwater and Condensate Systems. Under these conditions, monitoring of the vacuum pump exhaust and isolation, if required, provides the defense in depth to the offgas system.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.19 LCO 3.8.1 - AC Sources (Operating)

Description

This set of Tech Specs provides operability requirements for the various operating AC electrical power subsystems. The following subsystems are required to be operable:

- Two qualified circuits between the offsite transmission network and the onsite Class 1E AC electrical power distribution system.
- Three diesel generators (DGs).
- Three automatic sequencers.

If one required offsite circuit is inoperable, it must be restored to operable status within 72 hours (Condition A.). If one required DG is inoperable, it must be restored to operable status within 72 hours (Condition B.). If two required offsite circuits are inoperable, one required offsite circuit must be restored to operable status within 24 hours (Condition C.). If one required offsite circuit and one required DG are inoperable, one required offsite circuit or one required DG must be restored to operable status within 12 hours (Condition D.). If two or three required DGs are inoperable, one required DG must be restored to operable status within 2 hours (Condition E.). If one required automatic load sequencer is inoperable, it must be restored to operable status within 12 hours (Condition F.). If the required actions and associated completion times cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. These changes would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The following AC electrical power sources shall be operable:

- Two qualified circuits between the offsite transmission network and the onsite Class 1E AC electrical power distribution system.
- Three diesel generators.
- Three automatic sequencers.

Conditions Requiring Entry into End State

If the LCO cannot be met, the following actions must be taken for the listed condition:

- If one required offsite circuit is inoperable, it must be restored to operable status within 72 hours.
- If one required DG is inoperable, it must be restored to operable status within 72 hours.
- If two required offsite circuits are inoperable, one required offsite circuit must be restored to operable status within 24 hours.
- If one required offsite circuit and one required DG are inoperable, one required offsite circuit or one required DG must be restored to operable status within 12 hours.
- If two or three required DGs are inoperable, one required DG must be restored to operable status within 2 hours.
- If one required automatic load sequencer is inoperable, it must be restored to operable status within 12 hours.
- If the required actions and associated completion times cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action G.2.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in the proposed Mode 3 (assuming the individual failure conditions) are lower or comparable to the current end state. Events initiated by loss of offsite power are dominant contributors to core damage frequency in most BWR PSAs, and the steam-driven core cooling systems play a major role in mitigating these events. Going to Mode 4 for the specified inoperable conditions would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System in service. Based on the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the equipment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

If degraded conditions exist such that it is necessary to enter Mode 3 via this Tech Spec, redundant AC sources are available to maintain the Mode 3 condition. Further, the probability of a LOCA is reduced due to the short amount of time in Mode 3.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.20 LCO 3.8.4 - DC Sources (Operating)

Description

This Tech Spec provides operability requirements for the operating DC sources. If one DC electrical power subsystem is inoperable, it must be restored to operable status within 2 hours (Condition A.). If the DC Electrical Power Subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to remove the requirement to place the plant in Mode 4. This change would allow repair of the equipment to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The Division 1 and Division 2 station service and DG 1B, 2A, and 2C DC electrical power subsystems must be operable.

Condition Requiring Entry into End State

If one DC electrical power subsystem is inoperable, it must be restored to operable status within 2 hours (Condition A.). If the DC Electrical Power Subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action B.2.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in Mode 3 (assuming the individual failure conditions) are lower or comparable to the current end state. Events initiated by loss of offsite power are dominant contributors to core damage frequency in most BWR PSAs, and the steam-driven core cooling systems play a major role in mitigating these events. Going to Mode 4 for one inoperable DC

Electrical Power Subsystem would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows the inoperable equipment to be repaired in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

If one of the DC electrical power subsystems is inoperable, the remaining DC electrical power subsystems have the capacity to support a safe shutdown and to mitigate an accident condition.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.21 LCO 3.8.7 - Inverters (Operating)

Description

This Tech Spec provides operability requirements for the operating inverters. If one required inverter is inoperable, it must be restored to operable status within 24 hours (Condition A.). If the required inverter cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to remove the requirement to place the plant in Mode 4. This change would allow repair of the equipment to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The Division 1 and Division 2 inverters shall be operable.

Condition Requiring Entry into End State

If one required inverter is inoperable, it must be restored to operable status within 24 hours (Condition A.). If the required inverter cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action B.2.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in Mode 3 (assuming the individual failure conditions) are lower or comparable to the current end state. Events initiated by loss of offsite power are dominant contributors to core damage frequency in most BWR PSAs, and the steam-driven core cooling systems play a major role in mitigating these events. Going to Mode 4 for one inoperable inverter would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows the inoperable equipment to be repaired in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

Remaining sources are available to supply the required power to maintain the Mode 3 condition. Further, the probability of a LOCA is reduced due to the short amount of time in Mode 3.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.1.22 LCO 3.8.9 - Distribution Systems - Operating

Description

This set of Tech Specs provides operability requirements for the operating electrical distribution systems. If one or more AC electrical power distribution subsystems are inoperable, one subsystem must be restored to operable status within eight hours (Condition A.). If one or more AC vital buses are inoperable, the subsystem must be restored to operable status within two hours (Condition B.). If one or more station service DC electrical power distribution subsystems are inoperable, the subsystem must be restored to operable status within two hours (Condition C.). If the required actions and associated completion times cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. These changes would allow repair of the equipment to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Division 1 and Division 2 AC, DC, and AC vital bus electrical power distribution subsystems shall be operable.

Conditions Requiring Entry into End State

If the LCO cannot be met, the following actions must be taken for the listed condition:

- If one or more AC electrical power distribution subsystems are inoperable, one subsystem must be restored to operable status within eight hours (Condition A.).
- If one or more AC vital buses are inoperable, the subsystem must be restored to operable status within two hours (Condition B.).
- If one or more station service DC electrical power distribution subsystems are inoperable, the subsystem must be restored to operable status within two hours (Condition C.).
- If the required actions and associated completion times cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action D.2.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in the proposed Mode 3, assuming the individual failure conditions, are lower or comparable to the current end state. Events initiated by loss of offsite power are dominant contributors to core damage frequency in most BWR PSAs, and the steam-driven core cooling systems play a major role in mitigating these events. Going to Mode 4 for the specified inoperable conditions would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows the equipment to be repaired in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

In addition, sufficient sources remain to supply the required power to maintain the Mode 3 condition. Further, the probability of a LOCA is reduced due to the short amount of time in Mode 3.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2 BWR-6 End State Assessments

4.5.2.1 LCO 3.3.8.2 - Reactor Protection System (RPS) Electric Power Monitoring

Description

This Tech Spec provides operability requirements for the RPS electronic power monitoring assemblies. If one or both inservice power supplies with one electric power monitoring assemblies is inoperable, the associated inservice power supply(s) must be removed from service within 72 hours (Condition A.). In addition, if one or both inservice power supplies has both electric power monitoring assembly inoperable, the associated inservice power supply(s) must be removed from service within one hour (Condition B.). If the inservice power supply(s) cannot be removed from service within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow the inoperable equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two RPS electric power monitoring assemblies shall be operable for each inservice RPS motor generator set or alternate power supply.

Condition Requiring Entry into End State

If the LCO cannot be met, the associated inservice power supply(s) must be removed from service within 72 hours for one EPM assembly inoperable or one hour for both EPM assemblies inoperable. If the inservice power supply(s) cannot be removed from service within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Delete Required Action C.2.

Basis for Proposed Change

The specific failure condition of interest is not risk significant in BWR PSAs. If the required restoration actions cannot be completed within the specified time, going to Mode 4 would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low probability of an accident, low probability of a condition that could cause equipment damage, and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the inoperable equipment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The function of the RPS Electric Power Monitoring System is to isolate the RPS bus from the motor generator set or an alternate power supply in the event of overvoltage, undervoltage, or underfrequency. To reach Mode 3 per the Tech Specs, there must be a functioning power supply with degraded protective circuitry in operation. However, as discussed in the Tech Spec basis, the overvoltage, undervoltage, or underfrequency condition must persist for an extended time period to cause damage. There is a low probability of this occurring in the short period of time that the plant will remain in Mode 3 without this protection.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.2 LCO 3.4.4 - Safety/Relief Valves (SRVs)

Description

This Tech Spec provides operability requirements for the safety function of the safety/relief valves (SRVs). If one required SRV is inoperable, the inoperable SRV must be returned to operability within 14 days (Condition A.). If the SRV cannot be returned to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow the inoperable SRV to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The safety function of seven SRVs shall be operable and the relief function of seven additional SRVs shall be operable.

Condition Requiring Entry into End State

If the LCO cannot be met with one SRV inoperable, the inoperable valve must be returned to operability within 14 days (Condition A.). If the SRV cannot be returned to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Delete Required Action B.2 and add Condition C. with Required Actions C.1 and C.2 to address two or more required SRVs inoperable.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in Mode 3 (assuming the individual failure conditions) are lower or comparable to the current end state. The specific failure condition of interest is not risk significant in BWR PSAs. Going to Mode 4 for one inoperable SRV would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low probability of loss of the necessary overpressure protection function and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the inoperable SRV to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The purpose of the SRV Tech Spec is to ensure that the plant is protected against severe overpressurization events. The low power level during Mode 3 makes the potential for an overpressure event remote. In addition, with one SRV inoperable, the remaining operable SRVs are capable of providing the necessary overpressure protection. Because of additional design margin, the ASME Code limits for the Reactor Coolant Pressure Boundary (RCPB) can also be satisfied with one SRV inoperable.

The proposed mode also allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.3 LCO 3.5.1 - ECCS (Operating)

Description

This set of ECCS Tech Specs provides operability requirements for the various ECCS subsystems. This set of Tech Specs requires that each ECCS injection/spray subsystem and the Automatic Depressurization System (ADS) function of eight SRVs are operable. If a subsystem is inoperable, it must be restored to operable status within a specified period of time. Depending on the combination of inoperable subsystems, if restoration to operable status cannot be made within the allotted time, the plant must be placed in Mode 3 within 12 hours and one of the following actions must be effected:

- The plant must be placed in Mode 4 within 36 hours.
- Reactor steam dome pressure must be reduced to ≤ 150 psig within 36 hours.

The particular change sought in this Tech Spec is to remove the above-mentioned secondary actions; i.e., keep the plant in Mode 3 until the required repair actions are completed without reducing reactor steam dome pressure to ≤150 psig and without entering LCO 3.0.3. These changes would allow repairs of inoperable ECCS subsytems to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Each ECCS injection/spray subsystem and the ADS function of eight SRVs shall be operable.

Conditions Requiring Entry into End State

If the LCO cannot be met, the following actions must be taken for the listed conditions:

- If one low pressure ECCS injection/spray subsystem is inoperable, the subsystem must be restored to operable status within seven days.

- If the HPCS System is inoperable, the RCIC System must be verified to be operable by administrative means within one hour and the HPCS System must be restored to operable status within 14 days.
- If two ECCS injection subsystems are inoperable or one ECCS injection subsystem and one ECCS spray subsystem are inoperable, one ECCS injection/spray subsystem must be restored to operable status within 72 hours.
- If the required actions associated with Conditions A., B., or C. cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.
- If one ADS valve is inoperable, the ADS valve must be restored to operable status within 14 days.
- If one ADS valve is inoperable and one low pressure ECCS injection/spray subsystem is inoperable, the ADS valve must be restored to operable status within 72 hours or the low pressure ECCS injection/spray subsystem must be restored to operable status within 72 hours.
- If the required action(s) from Conditions E. or F. cannot be met, the plant must be placed in Mode 3 within 12 hours and the reactor steam dome pressure reduced to ≤150 psig within 36 hours.

<u>Applicability</u>

BWR-6 Standard Technical Specification

<u>Proposed Modifications</u>

Delete Required Actions D.2 and G.2.

<u>Basis for Proposed Change</u>

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in the proposed Mode 3 (assuming the individual failure conditions) are lower or comparable to the current end state. Going to Mode 4 for the specified inoperable conditions would cause loss of the high pressure steam injection RCIC System, loss of the feedwater/condensate system, and require activating the RHR Shutdown Cooling System. In addition, maintaining the reactor steam dome pressure above 150 psig preserves the availability of the high pressure systems. It is concluded that, based on these lower or equivalent calculated risks, staying in Mode 3 to restore systems back to service is the preferred end state rather than going to Mode 4 or a mode where reactor pressure ≤150 psig.

<u>Defense-in-Depth Considerations</u>

The proposed change allows the inoperable ECCS systems to be repaired in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

The following systems are available in Mode 3 to maintain core cooling given specified inoperable subsystems for the most likely accident sequences in the PSA:

- If one low pressure ECCS injection/spray subsystem is inoperable during normal operation, the feedwater/condensate system is the primary cooling source. In addition, the HPCS System and high pressure steam-driven injection RCIC System are available for reactor water makeup should this system fail. If the high pressure system(s) should fail, the reactor can be depressurized and the remaining operable low pressure ECCS injection/spray subsystems can be brought on line.
- If the HPCS System is inoperable during normal operation, the feedwater/condensate system is the primary cooling source. In addition, the high pressure steam-driven injection RCIC System is available for reactor water makeup should this system fail. If the RCIC System should fail, the reactor can be depressurized and the remaining operable low pressure ECCS injection/spray subsystems can be brought on line.
- If two or more low pressure ECCS injection/spray subsystems are inoperable during normal operation, the feedwater/condensate system is the primary cooling source. In addition, the HPCS System and high pressure steam-driven injection RCIC System are available for reactor water makeup should this system fail. If the high pressure system(s) should fail, the reactor can be depressurized and the remaining operable low pressure ECCS injection/spray subsystems can be brought on line.
- If one ADS valve is inoperable and/or one low pressure ECCS injection/spray subsystem is inoperable during normal operation, the feedwater/condensate system is the primary cooling source. In addition, the HPCS System and high pressure steam-driven injection RCIC System are available for reactor water makeup should this system fail. If the high pressure system(s) should fail, the EPGs and EOPs direct the operator to take control of the depressurization with the remaining operable SRVs, and the remaining operable low pressure ECCS injection/spray subsystems can be brought on line.

4.5.2.4 LCO 3.6.1.1 - Primary Containment

Description

This Tech Spec provides operability requirements for the primary containment. If the primary containment is inoperable, it must be returned to operability within one hour (Condition A.). If it cannot be returned to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow repair of the equipment to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The primary containment shall be operable.

Condition Requiring Entry into End State

If the LCO cannot be met, the primary containment must be returned to operability within one hour (Condition A.). If it cannot be returned to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Delete Required Action B.2.

Basis for Proposed Change

This LCO entry condition does not include gross leakage through an unisolated release path or containment rupture. Previous generic PSA work related to Appendix J requirements has shown that containment leakage is not risk significant. Going to Mode 4 for leakage in the primary containment would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low probability of an accident and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the primary containment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The function of the primary containment is to isolate and contain fission products released from the Reactor Pressure System following a Design Basis Accident (DBA). The DBA that postulates the maximum release of radioactive material within primary containment is a LOCA. The probability of a LOCA is reduced due to the short amount of time in Mode 3. In addition, for this event, the Standby Gas Treatment System (SGTS) would be available to filter fission products prior to their release to the environment.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

5.5.2.5 LCO 3.6.1.6 - Low-Low Set (LLS) Valves

Description

This Tech Spec provides operability requirements for the LLS function of four safety/relief valves. If one LLS valve is inoperable, it must be returned to operability within 14 days (Condition A.). If the LLS valve cannot be returned to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The LLS function of four safety/relief valves shall be operable.

Condition Requiring Entry into End State

If the LCO for one LLS valve cannot be met, the valve must be returned to operability within 14 days (Condition A.). If the LLS valve cannot be returned to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Delete Required Action B.2 and add Condition C. with Required Actions C.1 and C.2 to address two or more LLS valves inoperable.

Basis for Proposed Change

The specific failure condition of interest is not risk significant in BWR PSAs. With one LLS valve inoperable, the remaining operable LLS valves are adequate to perform the desired function. Going to Mode 4 for this inoperable condition would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low risk significance and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the LLS valve to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems.

After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The purpose of the LLS function is to prevent excessive short duration SRV cycling during an overpressure event. With the loss of one LLS valve, the designed safety function can be performed with the remaining operable LLS valves.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.6 LCO 3.6.1.7 - Residual Heat Removal (RHR) Containment Spray System

Description

This Tech Spec provides operability requirements for the Residual Heat Removal (RHR) Containment Spray System. If one RHR containment spray subsystem is inoperable, it must be restored to operable status within seven days (Condition A.). If two RHR containment spray subsystems are inoperable, one of the RHR containment spray subsystems must be restored to operable status within eight hours (Condition B.). If the RHR Containment Spray System cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow repair of the subsystem to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two RHR containment spray subsystems shall be operable.

Condition Requiring Entry into End State

If one RHR Containment Spray subsystem is inoperable, it must be restored to operable status within seven days (Condition A.). If two RHR Containment Spray subsystems are inoperable, one of them must be restored to operable status within eight hours (Condition B.). If the RHR Containment Spray System cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Delete Required Action C.2.

Basis for Proposed Change

Failure of these subsystems is not risk significant in most BWR PSAs. Going to Mode 4 for the specified inoperable conditions would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low probability of an event requiring the safety function, alternate methods to remove heat from primary containment, and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the RHR Containment Spray System to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

Following a LOCA, the RHR Containment Spray System removes heat from the primary containment airspace. A minimum of one RHR containment spray subsystem is required to mitigate potential bypass leakage paths and maintain the primary containment peak pressure below the design limits. The probability of a LOCA is reduced and alternate methods (e.g., containment vent) to remove heat from the primary containment are available due to the short amount of time in Mode 3.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.7 LCO 3.6.1.8 - Penetration Valve Leakage Control System (PVLCS)

Description

This Tech Spec provides operability requirements for the PVLCS subsystems. If one PVLCS subsystem is inoperable, it must be restored to operable status within 30 days (Condition A.). If two PVLCS subsystems are inoperable, one of the PVLCS subsystems must be restored to operable status within seven days (Condition B.). If the PVLCS subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow repair of the subsystem to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two PVLCS subsystems shall be operable.

Condition Requiring Entry into End State

If one PVLCS subsystem is inoperable, it must be restored to operable status within 30 days (Condition A.). If two PVLCS subsystems are inoperable, one of the PVLCS subsystems must be restored to operable status within seven days (Condition B.). If the PVLCS subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Delete Required Action C.2.

Basis for Proposed Change

This system is not significant in BWR PRAs. Going to Mode 4 when the PVLCS is inoperable would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low risk significance and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the PVLCS subsystem to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The PVLCS supplements the isolation function of the primary containment isolation valves (PCIVs) by processing the fission products that could leak through the closed PCIVs after a LOCA. The probability of a LOCA is reduced due to the short amount of time in Mode 3. In addition, for this event, the Standby Gas Treatment System (SGTS) would be available to filter fission products prior to their release to the environment.

The proposed mode also allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS and steam-driven high pressure injection RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.8 LCO 3.6.1.9 - Main Steam Isolation Valve (MSIV) Leakage Control System (LCS)

Description

This Tech Spec provides operability requirements for the MSIV LCS subsystems. If one MSIV LCS subsystem is inoperable, it must be restored to operable status within 30 days (Condition A.). If two MSIV LCS subsystems are inoperable, one of them must be restored to operable status within seven days (Condition B.). If the MSIV LCS subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow the subsystem to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two MSIV LCS subsystems shall be operable.

Condition Requiring Entry into End State

If one MSIV LCS subsystem is inoperable, it must be restored to operable status within 30 days (Condition A.). If two MSIV LCS subsystems are inoperable, one of them must be restored to operable status within seven days (Condition B.). If the MSIV LCS subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Delete Required Action C.2.

Basis for Proposed Change

This system is not significant in BWR PSAs and, based on a BWROG program, many plants have eliminated the system altogether. Going to Mode 4 for the specified inoperable conditions would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low risk significance and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the MSIV LCS subsystem to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The MSIV LCS supplements the isolation function of the MSIVs by processing the fission products that could leak through the closed MSIVs after a LOCA. The probability of a LOCA is reduced due to the short amount of time in Mode 3. In addition, for this event, the Standby Gas Treatment System (SGTS) would be available to filter fission products prior to their release to the environment.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS and steam-driven high pressure injection RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.9 LCO 3.6.2.3 - Residual Heat Removal (RHR) Suppression Pool Cooling

Description

This Tech Spec provides operability requirements for the Residual Heat Removal (RHR) Suppression Pool Cooling. If one RHR suppression pool cooling subsystem is inoperable, it must be restored to operable status within seven days (Condition A.). If the required action cannot be completed within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two RHR suppression pool cooling subsystems shall be operable.

Condition Requiring Entry into End State

If one RHR suppression pool cooling subsystem is inoperable, it must be restored to operable status within seven days (Condition A.). If the required action cannot be completed within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-4 Standard Technical Specification

Proposed Modification

Delete Required Action B.2 and add Condition C. with Required Actions C.1 and C.2 to address two RHR suppression pool cooling subsystems inoperable.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in Mode 3 (assuming the individual failure conditions) are lower or comparable to the current end state. Going to Mode 4 for this inoperable condition would cause loss of both high pressure steam-driven injection systems, loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows the equipment to be repaired in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The RHR Suppression Pool Cooling System is designed to remove heat from the suppression pool following a Design Basis Accident (DBA). The probability of a DBA is reduced due to the short amount of time in Mode 3. In addition, one loop of the RHR Suppression Pool Cooling System is sufficient to perform this safety function.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the steam-driven HPCI and RCIC Systems are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.10 LCO 3.6.4.1 - Secondary Containment

Description

This Tech Spec provides operability requirements for the secondary containment. If the secondary containment is inoperable, it must be restored to operable status within four hours (Condition A.). If the secondary containment cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. Also, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The secondary containment shall be operable.

Condition Requiring Entry into End State

If the secondary containment is inoperable, it must be restored to operable status within four hours (Condition A.). If the secondary containment cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Delete Required Action B.2.

Basis for Proposed Change

This LCO entry condition does not include gross leakage through an unisolated release path or secondary containment rupture. Previous generic PSA work related to Appendix J requirements has shown that containment leakage is not risk significant. Going to Mode 4 for leakage in the secondary containment would cause loss of the high pressure steamdriven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low probability of an accident and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows the secondary containment to be repaired in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

Following a Design Basis Accident (DBA), the function of the secondary containment is to contain, dilute, and hold up fission products that may leak from primary containment. The probability of a DBA is reduced due to the short amount of time in Mode 3.

The proposed mode also allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.11 LCO 3.6.4.3 - Standby Gas Treatment System (SGTS)

Description

This Tech Spec provides operability requirements for the Standby Gas Treatment System (SGTS). If one SGTS subsystem is inoperable, it must be restored to operable status within seven days (Condition A.). If the SGTS subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours. In addition, if two SGTS subsystems are inoperable in Mode 1, 2, or 3, LCO 3.0.3 must be entered immediately (Condition D.).

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed without entering LCO 3.0.3. This change would allow the subsystem(s) to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two SGTS subsystems shall be operable.

Condition Requiring Entry into End State

If one SGTS subsystem is inoperable, it must be restored to operable status within seven days (Condition A.). If the SGTS subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours. In addition, if two SGTS subsystems are inoperable in Mode 1, 2, or 3, LCO 3.0.3 must be entered immediately (Condition D.).

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Delete Required Action B.2. Change Required Action D.1 to "Be in Mode 3" with a Completion Time of "12 hours."

Basis for Proposed Change

Failure of the SGTS subsystem(s) is not risk significant in most BWR PSAs. Going to Mode 4 for the specified inoperable conditions would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low risk significance and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows the subsystem(s) to be repaired in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The function of the SGTS is to ensure that radioactive materials that leak from the primary containment into the secondary containment following a Design Basis Accident (DBA) are filtered and adsorbed prior to exhausting to the environment. The probability of a DBA is reduced due to the short amount of time in Mode 3.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.12 LCO 3.6.5.6 - Drywell Vacuum Relief System

Description

This Tech Spec provides operability requirements for the Drywell Vacuum Relief System. If one or two drywell post-LOCA vacuum relief subsystems are inoperable, the subsystem(s) must be restored to operable status within 30 days (Condition B.). If one drywell purge vacuum relief subsystem is inoperable for reasons other than the subsystem is not closed, the subsystem must be restored to operable status within 30 days (Condition C.). If the required actions cannot be completed within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. Also, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two drywell post-LOCA and two drywell purge vacuum relief subsystems shall be operable.

Condition Requiring Entry into End State

If one or two drywell post-LOCA vacuum relief subsystems are inoperable, the subsystem(s) must be restored to operable status within 30 days (Condition B.). If one drywell purge vacuum relief subsystem is inoperable for reasons other than the subsystem is not closed, the subsystem must be restored to operable status within 30 days (Condition C.). If the required actions cannot be completed within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Renumber Condition F. (and Required Action F.1, but deleting Required Action F.2) to Condition G. (and Required Action G.1) and apply the condition to Conditions B. and C. Renumber Condition G. (and Required Actions G.1 and G.2) to Condition H. (and Required Actions H.1 and H.2). Add a new Condition F. with Required Actions F.1 and F.2 to apply to Conditions A., D., and E.

Basis for Proposed Change

With one or two drywell post-LOCA vacuum relief subsystems inoperable or one drywell purge vacuum relief subsystem inoperable for reasons other than not being closed, the remaining operable vacuum relief subsystems are adequate to perform the depressurization mitigation function. The specific failure conditions of interest are not risk significant in BWR PSAs. Going to Mode 4 for the specified inoperable conditions would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low probability of an event requiring the safety function and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the equipment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The Drywell Vacuum Relief System is designed to transfer noncondensibles from the primary containment back to the drywell following a LOCA. The remaining operable vacuum relief subsystems are adequate to perform the depressurization mitigation function. The probability of a LOCA is reduced due to the short amount of time in Mode 3.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.13 LCO 3.7.1 - Standby Service Water (SSW) System and Ultimate Heat Sink (UHS)

Description

This Tech Spec provides operability requirements for the Standby Service Water (SSW) System and Ultimate Heat Sink (UHS). If one or more cooling towers with one cooling tower fan is inoperable, the cooling tower fan(s) must be restored to operable status within seven days

(Condition A.). If one SSW subsystem is inoperable for reasons other than Condition A., the SSW subsystem must be restored to operable status within 72 hours (Condition B.). If the required action(s) and associated completion time(s) cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. This change would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. Also, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Division 1 and 2 SSW subsystems and UHS shall be operable.

Condition Requiring Entry into End State

If one or more cooling towers with one cooling tower fan is inoperable, the cooling tower fan(s) must be restored to operable status within seven days (Condition A.). If one SSW subsystem is inoperable for reasons other than Condition A., the SSW subsystem must be restored to operable status within 72 hours (Condition B.). If the required action(s) and associated completion time(s) cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Transfer the second and third conditions of Condition C. to a new Condition D. as defined below. Delete Required Action C.2. The new Condition D. with Required Actions D.1 and D.2 shall address the remaining portion of Condition C.

Basis for Proposed Change

With the specified inoperable components/subsystems, a sufficient number of operable components/subsystems are available to perform the heat removal function. The specific failure condition of interest is not risk significant in BWR PSAs. Going to Mode 4 for the specified inoperable conditions would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low probability of an accident and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows the equipment to be repaired in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The SSW System is designed to provide cooling water for the removal of heat from certain safe shutdown-related equipment exchangers following a Design Basis Accident (DBA) or transient. The remaining operable components/subsystems can perform the heat removal function. The probability of a DBA or transient requiring safe shutdown is reduced due to the short amount of time in Mode 3.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.14 LCO 3.7.3 - Control Room Fresh Air (CRFA) System

Description

This Tech Spec provides operability requirements for the Control Room Fresh Air (CRFA) System. If one CRFA subsystem is inoperable, it must be restored to operable status within seven days (Condition A.). If the CRFA subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours. If two CRFA subsystems are inoperable in Mode 1, 2, or 3, LCO 3.0.3 must be entered immediately (Condition D.).

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed without entering LCO 3.0.3. This change would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two CRFA subsystems shall be operable.

Condition Requiring Entry into End State

If one CRFA subsystem is inoperable, it must be restored to operable status within seven days (Condition A.). If the CRFA subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours. If two CRFA subsystems are inoperable in Mode 1, 2, or 3, LCO 3.0.3 must be entered immediately (Condition D.).

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Delete Required Action B.2. Change Required Action D.1 to "Be in Mode 3" with a Completion Time of "12 hours."

Basis for Proposed Change

Failure in the CRFA System is not risk significant in most BWR PSAs. Going to Mode 4 for the specified inoperable conditions would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low risk significance and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the equipment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The CRFA System provides a radiologically controlled environment from which the plant can be safely operated following a Design Basis Accident (DBA). The probability of a DBA is reduced due to the short amount of time in Mode 3. In addition, for Condition A (i.e., one CRFA subsystem inoperable), redundant components in the CRFA System remain available, which are sufficient to perform this safety function.

The proposed mode also allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.15 LCO 3.7.4 - Control Room Air Conditioning (AC) System

Description

This Tech Spec provides operability requirements for the Control Room AC System. If one control room AC subsystem is inoperable, the subsystem must be restored to operable status within 30 days (Condition A.). If the control room AC subsystem cannot be restored to operable status within the allotted time, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours. If two control room AC subsystems are inoperable in Mode 1, 2, or 3, LCO 3.0.3 must be entered immediately (Condition D.).

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed without entering LCO 3.0.3. This change would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Two control room AC subsystems shall be operable.

Condition Requiring Entry into End State

If one control room AC subsystem is inoperable, it must be restored to operable status within 30 days (Condition A.). If the required actions and associated completion times cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours. If two control room AC subsystems are inoperable, LCO 3.0.3 must be entered immediately (Condition D.).

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Delete Required Action B.2. Change Required Action D.1 to "Be in Mode 3" with a Completion Time of "12 hours."

Basis for Proposed Change

Failure in these subsystems is not risk significant in most BWR PSAs. Going to Mode 4 for the specified inoperable conditions would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low risk significance and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows the equipment to be repaired in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The Control Room AC System provides temperature control for the control room following isolation of the control room. The probability of control room isolation being required is reduced due to the short amount of time in Mode 3. In addition, for Condition A (i.e., one control room AC subsystem inoperable), a sufficient number of redundant components in the Control Room AC System remain available to perform this safety function.

Further, the proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.16 LCO 3.7.5 - Main Condenser Offgas

Description

This Tech Spec provides operability requirements for the main condenser offgas. If the gross gamma activity rate of the noble gases in the main condenser offgas is not within limits, the gross gamma activity rate of the noble gases in the main condenser offgas must be restored to within limits within 72 hours (Condition A.). If the required action and associated completion time cannot be met, one of the following must occur:

- All steam lines must be isolated.
- The steam jet air ejectors (SJAE) must be isolated.
- The plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to remove the requirement to place the plant in Mode 4. This change would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The gross gamma activity rate of the noble gases measured at the offgas recombiner effluent shall be ≤380 mCi/second after decay of 30 minutes.

Condition Requiring Entry into End State

If the gross gamma activity rate of the noble gases in the main condenser offgas is not within limits, the gross gamma activity rate of the noble gases in the main condenser offgas must be restored to within limits within 72 hours (Condition A.). If the required action and associated completion time cannot be met, one of the following must occur:

- All steam lines must be isolated.
- The steam jet air ejectors (SJAE) must be isolated.
- The plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Delete Required Action B.3.2.

Basis for Proposed Change

Failure to maintain the gross gamma activity rate of the noble gases in the main condenser offgas within limits is not risk significant in most BWR PSAs. Going to Mode 4 for this inoperable condition would cause loss of both high pressure steam-driven injection systems, loss of the

Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the low risk significance and the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows resolving the cause of the elevated gross gamma activity rate to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

While in Mode 3, the mechanical vacuum pump would assist in maintaining the availability of the feedwater and condensate systems. Under these conditions, monitoring of the vacuum pump exhaust and isolation, if required, provides the defense-in-depth to the Offgas System.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.17 LCO 3.8.1 - AC Sources (Operating)

Description

This set of Tech Specs provides operability requirements for the various operating AC electrical power subsystems. The following subsystems are required to be operable:

- Two qualified circuits between the offsite transmission network and the onsite Class 1E AC electrical power distribution system.
- Three diesel generators (DGs).
- Three automatic sequencers.

If one required offsite circuit is inoperable, it must be restored to operable status within 72 hours (Condition A.). If one required DG is inoperable, it must be restored to operable status within 72 hours (Condition B.). If two required offsite circuits are inoperable, one required offsite circuit must be restored to operable status within 24 hours (Condition C.). If one required offsite circuit and one required DG are inoperable, one required offsite circuit or one required DG must be restored to operable status within 12 hours (Condition D.). If two required DGs are inoperable, one required DG must be restored to operable status within 2 hours (Condition E.). If one required automatic load sequencer is inoperable, it must be restored to operable status within 12 hours (Condition F.). If the required actions and associated completion times cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. These changes would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. Also, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The following AC electrical power sources shall be operable:

- Two qualified circuits between the offsite transmission network and the onsite Class 1E AC electrical power distribution system.
- Three diesel generators.
- Three automatic sequencers.

Conditions Requiring Entry into End State

If the LCO cannot be met, the following actions must be taken for the listed condition:

- If one required offsite circuit is inoperable, it must be restored to operable status within 72 hours.
- If one required DG is inoperable, it must be restored to operable status within 72 hours.
- If two required offsite circuits are inoperable, one required offsite circuit must be restored to operable status within 24 hours.
- If one required offsite circuit and one required DG are inoperable, one required offsite circuit or one required DG must be restored to operable status within 12 hours.
- If two required DGs are inoperable, one required DG must be restored to operable status within 2 hours.
- If one required automatic load sequencer is inoperable, it must be restored to operable status within 12 hours.
- If the required actions and associated completion times cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Delete Required Action G.2.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in the proposed Mode 3, assuming the individual failure conditions, are lower or comparable to the current end state. Events initiated by loss of offsite power are dominant contributors to core damage frequency in most BWR PSAs, and the steam-driven core cooling systems play a major role in mitigating these events. Going to Mode 4 for the specified inoperable conditions would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the equipment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

If degraded conditions exist such that it is necessary to enter Mode 3 via this Tech Spec, sufficient redundant AC sources are available to maintain the Mode 3 condition. Further, the probability of a LOCA is reduced due to the short amount of time in Mode 3.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.18 LCO 3.8.4 - DC Sources (Operating)

Description

This Tech Spec provides operability requirements for the operating DC sources. If either the Division 1 or 2 DC electrical power subsystem is inoperable, it must be restored to operable status within 2 hours (Condition A.). If the required action(s) and associated completion time(s) cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to remove the requirement to place the plant in Mode 4. This change would allow repair of the equipment to be made in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The Division 1, Division 2, and Division 3 DC electrical power subsystems shall be operable.

Condition Requiring Entry into End State

If either the Division 1 or 2 DC electrical power subsystem is inoperable, it must be restored to operable status within 2 hours (Condition A.). If the required action and associated completion time cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Renumber Condition C. (and Required Actions C.1 and C.2) to Condition D. (and Required Actions D.1 and D.2) and apply the condition to Condition C. Renumber Condition B. (and Required Action B.1) to Condition C. (and Required Action C.1). Add a new Condition B., which addresses Condition A., which is similar to existing Condition C. but with Required Action C.2 deleted.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in Mode 3, assuming the individual failure conditions, are lower or comparable to the current end state. Events initiated by loss of offsite power are dominant contributors to core damage frequency in most BWR PSAs, and the steam-driven core cooling systems play a major role in mitigating these events. Going to Mode 4 for one inoperable DC electrical power subsystem would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the inoperable equipment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

If one of the DC electrical power subsystems is inoperable, the remaining DC electrical power subsystems have the capacity to support a safe shutdown and to mitigate an accident condition.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.19 LCO 3.8.7 - Inverters - Operating

Description

This Tech Spec provides operability requirements for the operating inverters. If either the Division 1 or 2 inverter is inoperable, it must be restored to operable status within 24 hours (Condition A.). If the required action(s) and associated completion time(s) cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to remove the requirement to place the plant in Mode 4. This change would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. In addition, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

The Division 1 and Division 2 inverters shall be operable.

Condition Requiring Entry into End State

If either the Division 1 or 2 inverter is inoperable, it must be restored to operable status within 24 hours (Condition A.). If the required action and associated completion time cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Renumber Condition C. (and Required Actions C.1 and C.2) to Condition D. (and Required Actions D.1 and D.2) and apply the condition to Condition C. Renumber Condition B. (and Required Action B.1) to Condition C. (and Required Action C.1). Add a new Condition B., which addresses Condition A., which is similar to existing Condition C. but with Required Action C.2 deleted.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in Mode 3 (assuming the individual failure conditions) are lower or comparable to the current end state. Events initiated by loss of offsite power are dominant contributors to core damage frequency in most BWR PSAs, and the steam-driven core cooling systems play a major role in mitigating these events. Going to Mode 4 for one inoperable inverter would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows repairs of the inoperable equipment to be made in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

The remaining sources are sufficient to supply required power to maintain the Mode 3 condition. Further, the probability of a LOCA is reduced due to the short amount of time in Mode 3.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.5.2.20 LCO 3.8.9 - Distribution Systems (Operating)

Description

This set of Tech Spec provides operability requirements for the operating electrical distribution systems. If either Division 1 or 2 AC electrical power distribution subsystem is inoperable, it must be restored to operable status within eight hours (Condition A.). If either Division 1 or 2 AC vital bus is inoperable, it must be restored to operable status within two hours (Condition B.). If either Division 1 or 2 DC electrical power distribution subsystem is inoperable, it must be restored to operable status within two hours (Condition C.). If the required actions and associated completion times cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

The particular change sought in this Tech Spec is to keep the plant in Mode 3 until the required repair actions are completed. These changes would allow the equipment to be repaired in a plant-operating mode with lower risks than full power operation and without challenging the normal shutdown systems. Also, more operational subsystems are available in Mode 3 than Mode 4 to provide makeup water and cooling in the event of the most likely accident sequences in the PSA.

LCO

Division 1 and Division 2 AC, DC, and AC vital bus electrical power distribution subsystems shall be operable.

Condition Requiring Entry into End State

If the LCO cannot be met, the following actions must be taken for the listed condition:

- If either Division 1 or 2 AC electrical power distribution subsystem is inoperable, it must be restored to operable status within eight hours (Condition A.).
- If either Division 1 or 2 AC vital bus is inoperable, it must be restored to operable status within two hours (Condition B.).
- If either Division 1 or 2 DC electrical power distribution subsystem is inoperable, it must be restored to operable status within two hours (Condition C.).
- If the required actions and associated completion times cannot be met, the plant must be placed in Mode 3 within 12 hours and in Mode 4 within 36 hours.

Applicability

BWR-6 Standard Technical Specification

Proposed Modification

Delete Required Action D.2.

Basis for Proposed Change

A comparative PSA evaluation of the core damage risks of operation in the current end state versus the proposed Mode 3 end state was performed. The results indicate that the core damage risks while operating in the proposed Mode 3 (assuming the individual failure conditions) are lower or comparable to the current end state. Events initiated by loss of offsite power are dominant contributors to core damage frequency in most BWR PSAs, and the steam-driven core cooling systems play a major role in mitigating these events. Going to Mode 4 for the specified inoperable conditions would cause loss of the high pressure steam-driven injection system(s), loss of the Power Conversion System (condenser/feedwater system), and require activating the RHR System. Based on the number of systems available in Mode 3, it is concluded that the risks of staying in Mode 3 are lower than or equal to going to the Mode 4 end state.

Defense-in-Depth Considerations

The proposed change allows the equipment to be repaired in a plant operating mode with lower risks than full power operation and without challenging the normal shutdown systems. After repairs are made, the plant can be brought to full power operation with the least potential for transients and operator error.

Sufficient remaining sources are available to supply required power to maintain the Mode 3 condition. Further, the probability of a LOCA is reduced due to the short amount of time in Mode 3.

The proposed mode allows the use of feedwater/condensate for reactor water makeup and cooling. If a transient or accident should occur during this mode, the HPCS System and steam-driven high pressure injection RCIC System are available for water makeup, provided sufficient decay heat is available to sustain the Mode 3 condition. In addition, EPGs and EOPs direct the operator to take control of the depressurization function if low pressure injection/spray systems are needed for water makeup and cooling.

4.6 IMPLEMENTATION AND MONITORING PROGRAM

Regulatory Guide 1.182, "Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants", addresses general guidance for conduct of the risk evaluation, quantitative and qualitative guidelines for establishing risk management actions, and example risk management actions. These guidelines 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.

4.7 SUMMARY

The risk-informed analyses confirm that plant safety and operational improvements can be achieved by changes to the final end states for selected inoperable conditions in the Technical Specifications. The proposed changes allow the plant the flexibility to complete required repairs of inoperable systems or components and bring the plant back on line with a minimum number of operation and configuration changes. In addition, designed defense-in-depth and adequate safety margins are maintained.

5.0 REFERENCES

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

NUREG-1433, Rev. 1, "Standard Technical Specification, General Electric Plants, BWR /4, April 1995.

NUREG-1434, Rev. 1, "Standard Technical Specification, General Electric Plants, BWR /6, April 1995.

Regulatory Guide 1.174, "an Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis", July 1998.

Regulatory Guide 1.177, " An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications", August 1998.

Regulatory Guide 1.182, "Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants", May 2000.

APPENDIX A

QUALITY ASSURANCE ASSESSMENT

The baseline analyses used in this evaluation were from an existing BWR-4 plant PSA originally prepared as part of the Individual Plant Examination (IPE) in response to Generic letter 88-20. This PSA was included in the BWR Owners PSA Certification Program. The Certification meets an acceptable quality level to support risk informed decisions included in this report.

The baseline BWR-4 model was modified by GE to reflect operations during Mode 3 (hot shutdown) and Mode 4 (cold shutdown). Consideration was given to new operating conditions, success criteria, initiation events, and potential for human error. The resulting assumptions, data base, fault trees, and event trees were formally verified under the GE Quality Assurance Program. In addition, individual qualitative assessments and report conclusions were verified under the GE Quality Assurance Program.

APPENDIX B

TABLE OF PARTICIPATING UTILITIES

Table B-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

APPENDIX C

SUMMARY OF BWR-4 AND 6 END STATE ASSESSMENT

Table C-1

Summary of BWR-4 and 6 End State Assessment

BWR-4 Technical Specification				BWR-6 Technical Specification			
LCO Number	**Title**	**Proposed Mode**	**Basis Section**	**LCO Number**	**Title**	**Proposed Mode**	**Basis Section**
3.3.8.2	RPS Elect. Power Monitoring Conditions A & B	Mode 3	5.5.1.1	3.3.8.2	RPS Elect. Power Monitoring Conditions A & B	Mode 3	5.5.2.1
3.4.3	Safety/Relief Valves			3.4.4	Safety/Relief Valves		
A	One or two SRVs inoperable	Mode 3	5.5.1.2	A	A. One SRV inoperable	Mode 3	5.5.2.2
B	Three or more SRVs inoperable	No Change		B	B. Two or more S/RVs inoperable	No Change	
3.4.4	RCS Operational Leakage Conditions A, B, & C	No Change		3.4.5	RCS Operational Leakage Conditions A, B, and C	No Change	
3.4.5	RCS Pressure Isol. Valve Leakage Condition A	No Change		3.4.6	RCS Pressure Isol. Valve Leakage Condition A	No Change	
3.4.6	DW Floor Drain Sump Monitoring System Conditions A, B, C, D, & F	No Change		3.4.7	RCS Leakage Detection System Conditions A, B, C, D and F	No Change	
3.4.7	RCS Specific Activity Conditions A & B	No Change		3.4.8	RCS Specific Activity Conditions A and B	No Change	

Table C-1

Summary of BWR-4 and 6 End State Assessment

BWR-4 Technical Specification				**BWR-6 Technical Specification**			
LCO Number	**Title**	**Proposed Mode**	**Basis Section**	**LCO Number**	**Title**	**Proposed Mode**	**Basis Section**
3.4.10	RCS Pressure and Temp. Limits	No Change		3.4.11	RCS Pressure and Temp. Limits Condition A	No Change	
3.5.1	ECCS System			3.5.1	ECCS System		
A	1 LPCI or 1 LPCS	Mode 3	5.5.1.3	A	1 LPCI or 1 LPCS	Mode 3	5.5.2.3
C	HPCI	Mode 3	5.5.1.3	B	HPCS	Mode 3	5.5.2.3
D	HPCI & 1 LPCI or 1 LPCS	Mode 3	5.5.1.3	C	Two Injection subsystems or one Injection/one Spray inoperable	Mode 3	5.5.2.3
E	1 ADS Valve	Mode 3	5.5.1.3	E	1 ADS Valve	Mode 3	5.5.2.3
F	1 ADS Valve & 1 LPCI or 1 LPCS	Mode 3	5.5.1.3	F	1 ADS Valve & 1 LPCI or 1 LPCS	Mode 3	5.5.2.3
G	2 or more ADS Valves	No Change		G	2 or more ADS Valves	No Change	
H	2 or more LPCI/LPCS	No Change		H	HPCS & LPCS inoperable	No Change	
	or HPCI and 1 or more ADS Valves	No Change			or 3 or more Injection/Spray subsystems inoperable	No Change	

Table C-1 (Continued)

Summary of BWR-4 and 6 End State Assessment

BWR-4 Technical Specification				**BWR-6 Technical Specification**			
LCO Number	Title	Proposed Mode	Basis Section	LCO Number	Title	Proposed Mode	Basis Section
					or HPCS and 1 or more ADS Valves	No Change	
					or 2 or more Injection/Spray subsystems & 1 or more ADS Valves	No Change	
3.5.3	RCIC System Condition A	Mode 3	5.5.1.4.	3.5.3	RCIC System Condition A	No Change	
3.6.1.1	Primary Containment Condition A	Mode 3	5.5.1.5	3.6.1.1	Primary Containment Condition A	Mode 3	5.5.2.4
3.6.1.2	Primary Containment Air Lock Conditions A, B, & C	No Change		3.6.1.2	Primary Containment Air Lock Conditions A, B, and C	No Change	
3.6.1.3	Primary Containment Isol. Valves Conditions A, B, C, D, & E	No Change		3.6.1.3	Primary Containment Isol. Valves Conditions A, B, C, D, and E	No Change	
3.6.1.4	Drywell Pressure Condition A	No Change		3.6.1.4	Primary Containment Pressure Condition A	No Change	
3.6.1.5	Drywell Air Temperature Condition A	No Change		3.6.1.5	Primary Containment Air Temperature Condition A	No Change	

Table C-1 (Continued)

Summary of BWR-4 and 6 End State Assessment

BWR-4 Technical Specification				**BWR-6 Technical Specification**			
LCO Number	Title	Proposed Mode	Basis Section	LCO Number	Title	Proposed Mode	Basis Section
3.6.1.6	Low-Low Set Valves			3.6.1.6	Low-Low Set Valves		
A	One LLS valve inoperable	Mode 3	5.5.1.6	A	One LLS valve inoperable	Mode 3	5.5.2.5
B	Two or more LLS valves inoperable	No Change		B	Two or more LLS valves inoperable	No Change	
3.6.1.7	Reactor Bldg. to Suppression Chamber Vacuum Breakers						
A	One or more lines with one vacuum breaker not closed.	No change					
B	One or more lines with two vacuum breakers not closed.	No Change					
C	One line with one or more vacuum breakers inoperable for opening.	Mode 3	5.5.1.7				
D	Two or more lines with one or more vacuum breakers inoperable for opening.	No Change					
3.6.1.8	Suppression Chamber to Drywell Vacuum Breakers						

Table C-1 (Continued)

Summary of BWR-4 and 6 End State Assessment

BWR-4 Technical Specification				**BWR-6 Technical Specification**			
LCO Number	Title	Proposed Mode	Basis Section	LCO Number	Title	Proposed Mode	Basis Section
A	One vacuum breaker inoperable for opening.	Mode 3	5.5.1.8				
B	One vacuum breaker not closed.	No Change					
				3.6.1.7	RHR Containment Spray Conditions A and B	Mode 3	5.5.2.6
				3.6.1.8	Penetration Valve Leakage Control System - Conditions A and B	Mode 3	5.5.2.7
3.6.1.9	MSIV Leakage Control System Conditions A & B	Mode 3	5.5.1.9	3.6.1.9	MSIV Leakage Control System Conditions A and B	Mode 3	5.5.2.8
3.6.2.1	Suppression Pool Average Temp. Conditions D & E	No Change		3.6.2.1	Suppression Pool Average Temp. Conditions D and E	No Change	
3.6.2.2	Suppression Pool Water Level Condition A	No Change		3.6.2.2	Suppression Pool Water Level Condition A	No Change	
3.6.2.3	RHR Supp. Pool Cooling			3.6.2.3	RHR Suppression Pool Cooling		
A	One RHR Subsystem Inoperable	Mode 3	5.5.1.10	A	One RHR Subsystem Inoperable	Mode 3	5.5.2.9

Table C-1 (Continued)

Summary of BWR-4 and 6 End State Assessment

BWR-4 Technical Specification				**BWR-6 Technical Specification**			
LCO Number	Title	Proposed Mode	Basis Section	LCO Number	Title	Proposed Mode	Basis Section
B	Both RHR Subsystems Inoperable	No Change		B	Both RHR Subsystems Inoperable	No Change	
				3.6.2.4	Suppression Pool Makeup System Conditions A, B, and C	No Change	
3.6.2.4	RHR Suppression Pool Spray Conditions A & B	Mode 3	5.5.1.11				
3.6.4.1	Secondary Containment Condition A	Mode 3	5.5.1.12	3.6.4.1	Secondary Containment Condition A	Mode 3	5.5.2.10
3.6.4.2	Secondary Containment Isol. Valves Conditions A & B	No Change		3.6.4.2	Secondary Containment Isol. Valves Conditions A and B	No Change	
3.6.4.3	Standby Gas Treatment System Conditions A & D	Mode 3	5.5.1.13	3.6.4.3	Standby Gas Treatment System Conditions A and B	Mode 3	5.5.2.11
				3.6.5.2	Drywell Air Lock Conditions A, B, and C	No Change	
				3.6.5.3	Drywell Isolation Valves Conditions A and B	No Change	
				3.6.5.4	Drywell Pressure Condition A	No Change	

Table C-1 (Continued)

Summary of BWR-4 and 6 End State Assessment

BWR-4 Technical Specification				**BWR-6 Technical Specification**			
LCO Number	Title	Proposed Mode	Basis Section	LCO Number	Title	Proposed Mode	Basis Section
				3.6.5.5	Drywell Air Temperature Condition A	No Change	
				3.6.5.6	Drywell Vacuum Relief System		
				A	One or more vacuum relief subsystems not closed.	No Change	
				B	One or two DW post-LOCA vacuum relief subsystems fail to open.	Mode 3	5.5.2.12
				C	One DW purge vacuum relief subsystem fail to open.	Mode 3	5.5.2.12
				D	Two DW purge vacuum relief subsystems fail to open.	No Change	
				E	Two DW post-LOCA vacuum relief subsystems and one DW purge vacuum relief subsystem fail to open.	No Change	

Table C-1 (Continued)

Summary of BWR-4 and 6 End State Assessment

BWR-4 Technical Specification				**BWR-6 Technical Specification**			
LCO Number	Title	Proposed Mode	Basis Section	LCO Number	Title	Proposed Mode	Basis Section
				G	Two DW purge vacuum relief subsystems and one or two DW post-LOCA vacuum relief subsystems fail to open.	No Change	
3.7.1	RHR Service Water System						
A	One RHRSW pump inoperable.	Mode 3	5.5.1.14				
B	One RHRSW pump in each subsystem inoperable.	Mode 3	5.5.1.14				
C	One RHRSW subsystem inoperable for reasons other than Condition A.	Mode 3	5.5.1.14				
D	Both RHRSW subsystem inoperable for reasons other than Condition B.	No Change					
3.7.2	Plant Service Water and Ultimate Heat Sink System			3.7.1	Standby Service Water System and Ultimate Heat Sink		
A	One pump inoperable	Mode 3	5.5.1.15	A	One or more cooling towers with one cooling tower fan inoperable.	Mode 3	5.5.2.13

Table C-1 (Continued)

Summary of BWR-4 and 6 End State Assessment

BWR-4 Technical Specification				**BWR-6 Technical Specification**			
LCO Number	Title	Proposed Mode	Basis Section	LCO Number	Title	Proposed Mode	Basis Section
B	One pump in each subsystem inoperable.	Mode 3	5.5.1.15	B	One SSW System inoperable for reasons other than A.	Mode 3	5.5.2.13
C	One or more cooling towers with one cooling tower fan inoperable.	No Change		C	Both SSW Systems inoperable or Ultimate Heat Sink inoperable.	No Change	
D	One subsystem inoperable.	No Change					
E	Both subsystems inoperable or Ultimate Heat Sink inoperable.	No Change					
3.7.4	MCREC System Conditions A & D	Mode 3	5.5.1.16	3.7.3	Control Room Fresh Air System Conditions A and D	Mode 3	5.5.2.14
3.7.5	Control Rm. Air Conditioning System Conditions A & D	Mode 3	5.5.1.17	3.7.4	Control Room Air Conditioning System - Conditions A and D	Mode 3	5.5.2.15
3.7.6	Main Condenser Offgas Condition A	Mode 3	5.5.1.18	3.7.5	Main Condenser Offgas Condition A	Mode 3	5.5.2.16
3.8.1	AC Sources - Operating			3.8.1	AC Sources - Operating		
A	1 Offsite Circuit inoperable	Mode 3	5.5.1.19	A	1 Offsite Circuit inoperable	Mode 3	5.5.2.17

Table C-1 (Continued)

Summary of BWR-4 and 6 End State Assessment

BWR-4 Technical Specification				**BWR-6 Technical Specification**			
LCO Number	Title	Proposed Mode	Basis Section	LCO Number	Title	Proposed Mode	Basis Section
B	1 Diesel Generator inoperable	Mode 3	5.5.1.19	B	1 Diesel Generator inoperable	Mode 3	5.5.2.17
C	2 Offsite Circuits inoperable	Mode 3	5.5.1.19	C	2 Offsite Circuits inoperable	Mode 3	5.5.2.17
D	1 Offsite circuit & 1 DG inoperable	Mode 3	5.5.1.19	D	1 Offsite circuit & 1 Diesel Generator inoperable	Mode 3	5.5.2.17
E	2 Diesel Generators inoperable	Mode 3	5.5.1.19	E	2 Diesel Generators inoperable	Mode 3	5.5.2.17
F	1 Automatic Load Sequencer inoperable.	Mode 3	5.5.1.19	F	1 Automatic Load Sequencer inoperable.	Mode 3	5.5.2.17
H	3 or More AC Sources	No Change		H	3 or More AC Sources	No Change	
3.8.4	DC Sources - Operating A - 1 DC Electrical Power Subsystem	Mode 3	5.5.1.20	3.8.4	DC Sources - Operating		
				A	Div. 1 or 2 DC Electrical Power Subsystem inoperable	Mode 3	5.5.2.18
3.8.7	Inverters Condition A	Mode 3	5.5.1.21	3.8.7	Inverters Condition A	Mode 3	5.5.2.19

Table C-1 (Continued)

Summary of BWR-4 and 6 End State Assessment

BWR-4 Technical Specification				**BWR-6 Technical Specification**			
LCO Number	Title	Proposed Mode	Basis Section	LCO Number	Title	Proposed Mode	Basis Section
3.8.9	Electrical Power Distribution Systems			3.8.9	Electrical Power Distribution Systems		
A	1 or More AC Distribution Systems	Mode 3	5.5.1.22	A	1 Div. 1 or 2 AC Distribution Subsystem inoperable	Mode 3	5.5.2.20
B	1 or More AC Vital Buses	Mode 3	5.5.1.22	B	1 Div. 1 or 2 AC Vital Buses inop.	Mode 3	5.5.2.20
C	1 or More DC Distribution Systems	Mode 3	5.5.1.22	C	1 Div. 1 or 2 DC Distribution	Mode 3	5.5.2.20
F	2 or More Distribution Systems	No Change		F	2 or More Distribution Systems	No Change	