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Washington, DC 20555-0001

SUBJECT: **TRANSMITTAL OF BWROG REPORT, NEDC-0000-0032-9578, "TECHNICAL JUSTIFICATION TO SUPPORT RISK-INFORMED MODIFICATIONS TO SELECTED TECHNICAL SPECIFICATIONS FOR CONDITIONS LEADING TO EXIGENT PLANT SHUTDOWN FOR BWR PLANTS"**

We are transmitting the subject report in connection with the Risk Informed Technical Specification Task Force (RITSTF) Initiative 6. The BWR Owners' Group (BWROG) has developed this report as a part of the RITSTF and has coordinated its submittal with the Nuclear Energy Institute.

This document provides the results of the application of a risk-informed analysis to identify improvements to selected BWR Technical Specifications (TS) for conditions leading to exigent plant shutdown. The selected TS conditions included in this analysis involve loss of system function which require entry into Limiting Condition of Operation (LCO) 3.0.3. LCO 3.0.3 specifies action to be initiated within one hour to prepare for an orderly shutdown. The analysis provides the basis for replacing the LCO 3.0.3 entry with a risk-informed action based on the system's risk significance. Either a seven-day or a one-day completion time (CT), depending on the plant's core damage frequency, is recommended to allow the plant staff adequate time to fully evaluate the conditions and take appropriate corrective action. The proposed change reduces the potential for unnecessary unscheduled plant shutdowns and minimizes the transition and realignment risks related to shutdowns. The analysis is applicable for all US BWR products (BWR-2 through 6).

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If you have any questions regarding this report, please contact Fred Emerson (GE) at (910) 675-5615.

Sincerely,

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Technical Justification to Support Risk-Informed Modifications to Selected Technical Specifications for Conditions Leading to Exigent Plant Shutdown for BWR Plants

BWR Owners' Group
Risk-Informed Technical Specifications Committee

IMPORTANT NOTICE REGARDING CONTENTS OF THIS REPORT

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ABSTRACT

This document provides the results of the application of a risk-informed analysis to identify improvements to selected BWR Technical Specifications (TS) for conditions leading to exigent plant shutdown. The selected TS conditions included in this analysis involve loss of system function which require entry into Limiting Condition of Operation (LCO) 3.0.3. LCO 3.0.3 specifies action to be initiated within one hour to prepare for an orderly shutdown. The analysis provides the basis for replacing the LCO 3.0.3 entry with a risk-informed action based on the system's risk significance. Either a seven-day or a one-day completion time (CT), depending on the plant's core damage frequency, is recommended to allow the plant staff adequate time to fully evaluate the conditions and take appropriate corrective action. The proposed change reduces the potential for unnecessary unscheduled plant shutdowns and minimizes the transition and realignment risks related to shutdowns.

The analysis is applicable for all the BWR products (BWR-2 through 6).

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ACRONYMS

BWR	Boiling Water Reactor
BWROG	Boiling Water Reactor Owners' Group
CCDP	Conditional Core Damage Probability
CDF	Core Damage Frequency
CE	Combustion Engineering
CEOG	Combustion Engineering Owners' Group
CRFA	Control Room Fresh Air
CT	Completion Time
GE	General Electric Company
ICCDP	Incremental Conditional Core Damage Probability
ICLERP	Incremental Conditional Large Early Release Probability
ICRRP	Incremental Conditional Radiation Release Probability
STS	Standard Technical Specifications
LCO	Limiting Condition of Operation
LER	Large Early Release
LERF	Large Early Release Frequency
LERP	Large Early Release Probability
LOCA	Loss-of-Coolant Accident
MCREC	Main Control Room Environmental Control
NRC	Nuclear Regulatory Commission
PSA	Probabilistic Safety Analysis
PRA	Probabilistic Risk Assessment
RG	Regulatory Guide
RRF	Radiation Release Frequency
SGT	Standby Gas Treatment
STS	Standard Technical Specifications
TS	Technical Specifications
WOG	Westinghouse Owners' Group

EXECUTIVE SUMMARY

This report addresses one of several industry based initiatives to support the development of a Global Risk-Informed Plant Technical Specifications (TS). This report is similar to a report submitted by the Westinghouse Owners' Group (WOG) during August 2004 (Reference 1) for the Combustion Engineering (CE) plants. The NRC, in Reference 2, has approved the proposed changes given in the WOG report.

Based on a survey of BWR owners, the BWROG identified specific risk-informed TS change initiatives that have a high probability of enhancing plant safety and providing needed flexibility in the performance of corrective maintenance during power operations. Specifically, this report provides the basis to change various TS Required Action Statements for selected conditions that imply a loss of function related to a system in the plant TS. It is recommended that the current Required Action be changed from the LCO 3.0.3 entry to a risk-informed action based on the system's risk significance. Either a seven-day or a one-day [depending on the plant's core damage frequency (CDF)] completion time (CT) to restore the system function is recommended for the selected TS conditions. These proposed changes are a subset of all conditions leading to exigent plant shutdowns. Three of the systems [Standby Gas Treatment (SGT) System, Main Control Room Environmental Control (MCREC) System, and Control Room Air Conditioning (AC) System], considered in this analysis have no direct contribution to core damage or large early release. One other system considered in this analysis, [Reactor Coolant System (RCS) Leakage Detection Instrumentation], could potentially increase the LOCA frequency and, therefore, affect the core damage frequency (CDF) and large early release frequency (LERF). The remaining TS conditions that lead to exigent plant conditions that have a direct effect on either core damage or large early release are outside the scope of this analysis, but may be considered at a later date.

The proposed TS changes are summarized in Table 2-1. Two options are provided in Table 2-1 based on the individual plant's CDF. These changes are risk-informed and are in conformance with Regulatory Guide (RG) 1.174 and RG 1.177 (References 3 and 4). Risk assessments performed to support these modifications are based on a bounding analysis and are applicable to the participating BWRs listed in Table A-1. Furthermore, risks associated with the implementation of these TS changes will be managed in accordance with paragraph a(4) of 10 CFR 50.65 (Maintenance Rule).

The benefit derived from these changes provides needed flexibility in the performance of corrective maintenance of these systems during power operation. These actions will avert the costs and risks associated with plant shutdowns and ensure that the public health and safety is preserved.

1.0 INTRODUCTION/BACKGROUND

During 1999, the BWR Owners' Group (BWROG) formed a committee to identify risk-informed Technical Specifications (TS) improvements. This activity was part of a NRC and Industry Joint Owners' Group program to define and implement risk-informed TS changes. Eight initiatives were identified as potential candidates for risk-informed TS improvements.

This report provides technical justification for replacing entry into Limiting Condition of Operation (LCO) 3.0.3 with a defined risk-informed action. This report is similar to the report submitted by the Westinghouse Owners' Group (WOG) during August 2004 (Reference 1) for the Combustion Engineering (CE) plants. The NRC, in Reference 2, has approved the proposed changes given in this report.

An evaluation was conducted to determine the TS to be considered in this analysis using the Standard Technical Specifications (STS) for BWR 4 and BWR 6 plants (References 5 and 6). A survey of BWR owners was then conducted to identify the specific risk-informed TS change initiatives that have a high probability of enhancing plant safety and providing needed flexibility in the performance of corrective and preventive maintenance during power operations. From this survey, four TS were selected as candidates for change. The systems include Reactor Coolant System Leakage Detection Instrumentation, Standby Gas Treatment (SGT) System, Main Control Room Environmental Control (MCREC) System, and Control Room Air Conditioning (AC) System. BWR Owners have also deemed these systems to have a higher than average likelihood of generating the need for Notices of Enforcement discretions. The SGT System, MCREC System, and Control Room AC System have no direct contribution to either core damage or large early release. The RCS Leakage Detection Instrumentation could potentially increase the LOCA frequency and, therefore, affect the core damage frequency (CDF) and large early release frequency (LERF). Two options are provided in this analysis based on the individual plant's CDF. The remaining TS change candidates, not selected for this analysis, may be considered at a later date.

The intent of the proposed modifications to the plant TS is to enhance overall plant safety by:

- Avoiding unnecessary unscheduled plant shutdowns.
- Minimizing plant transitions and associated transition and realignment risks.
- Providing for increased flexibility in scheduling and performing maintenance and surveillance activities.
- Providing explicit guidance where none currently exists.

Risk assessments performed within the scope of this analysis are consistent with the general guidance of Regulatory Guide (RG) 1.174 and RG 1.177. The risk-informed assessments of the proposed TS modifications are established based on bounding assumptions. Alternate risk measures (similar to incremental conditional large early release probability (ICLERP) and change in large early release frequency (ΔLERF)) were established for the three systems that do not have a direct impact on either CDF or LERF. These risk measures include: (1) the incremental conditional radiation release (above system design limits) probability (ICRRP) and (2) the change in the radiation release (above system design limits) frequency (ΔRRF). The acceptance criteria for ICLERP and ΔLERF were used for ICRRP and ΔRRF, respectively.

2.0 SCOPE OF PROPOSED CHANGES TO TECHNICAL SPECIFICATIONS

This report justifies modifications to selected TS Required Action Statements for the conditions that imply a loss of function related to a system included within the scope of the plant TS. It is recommended that the current Required Action be changed from entry into LCO 3.0.3, to a risk-informed action based on the system's risk significance. A seven-day allowed CT to restore the system function is recommended for the selected TS conditions summarized in Table 2-1 for plants having a CDF ≤ 2.5E-05/year (Option 1). For plants that are bounded by a CDF ≤ 1.0E-04/year (Option 2), a proposed one-day allowed CT is provided in Table 2-1. The STS numbering system (see References 5 and 6) is used for convenience. However, the technical evaluation supports these changes for all BWRs with equivalent TS requirements and system functions. The BWR plants participating in this analysis are listed in Appendix A.

It should be noted that the current BWR 6 plant-specific Technical Specifications allow a seven-day CT for an inoperable Control Room AC System. Therefore, this document does not propose changes to the Control Room AC System CT for BWR 6 plants. In addition, several plants have CTs ≥ 24 hours for an inoperable MCREC System.

The benefit from these changes is that the proposed CT extensions provide needed flexibility in the performance of corrective maintenance of these systems during power operation. These actions will avert the costs and risks associated with plant shutdowns while ensuring that the public health and safety is preserved.

The methodology for assessing the risk impact of the proposed modifications is described in Section 3. Section 4 provides the results of the risk-informed evaluation for the TS under consideration.

The proposed actions provide a risk-informed process for establishing shutdown priorities and therefore provide adequate protection of the public health and safety. Furthermore, by averting unnecessary plant shutdowns the overall risk of plant operation is reduced.

Table 2-1 Proposed Modifications to Technical Specifications

Option 1 – Plants Having CDF ≤ 2.5E-05/Year

System[1]	TS LCO[1]	Inoperability	Current Action	Proposed Time to Restore One Subsystem
Reactor Coolant System (RCS) Leakage Detection Instrumentation	BWR 4: 3.4.6 BWR 6: 3.4.7	All required leakage detection systems inoperable.	Enter LCO 3.0.3	7 days
Standby Gas Treatment (SGT) System	BWR 4: 3.6.4.3 BWR 6: 3.6.4.3	Two SGT subsystems inoperable.	Enter LCO 3.0.3	7 days
Main Control Room Environmental Control (MCREC) System	BWR 4: 3.7.4	Two MCREC subsystems inoperable.	Enter LCO 3.0.3	7 days
Control Room Fresh Air (CRFA) System[2]	BWR 6: 3.7.3	Two CRFA subsystems inoperable.	Enter LCO 3.0.3	7 days
Control Room Air Conditioning (AC) System	BWR 4: 3.7.5	Two Control Room AC subsystems inoperable.	Enter LCO 3.0.3	7 days

Table 2-1 Notes:

(1) The Standard Technical Specifications (STS) system name and numbering are used for convenience. The analysis provided in this document supports changes for all BWRs plants that have similar design functions.

(2) The BWR 6 CRFA System performs the same function as the BWR 4 MCREC System.

Table 2-1 (Cont.) Proposed Modifications to Technical Specifications

Option 2 – Plants Having CDF ≤ 1.0E-04/Year

System[1]	TS LCO[1]	Inoperability	Current Action	Proposed Time to Restore One Subsystem
Reactor Coolant System (RCS) Leakage Detection Instrumentation	BWR 4: 3.4.6 BWR 6: 3.4.7	All required leakage detection systems inoperable.	Enter LCO 3.0.3	1 day
Standby Gas Treatment (SGT) System	BWR 4: 3.6.4.3 BWR 6: 3.6.4.3	Two SGT subsystems inoperable.	Enter LCO 3.0.3	1 day
Main Control Room Environmental Control (MCREC) System	BWR 4: 3.7.4	Two MCREC subsystems inoperable.	Enter LCO 3.0.3	1 day
Control Room Fresh Air (CRFA) System[2]	BWR 6: 3.7.3	Two CRFA subsystems inoperable.	Enter LCO 3.0.3	1 day
Control Room Air Conditioning (AC) System	BWR 4: 3.7.5	Two Control Room AC subsystems inoperable.	Enter LCO 3.0.3	1 day

Table 2-1 Notes:

(1) The Standard Technical Specifications (STS) system name and numbering are used for convenience. The analysis provided in this document supports changes for all BWRs plants that have similar design functions.

(2) The BWR 6 CRFA System performs the same function as the BWR 4 MCREC System.

3.0 RISK ASSESSMENT APPROACH

This section presents the methodology for a risk-informed assessment of CTs when a system, which supports a design basis, is unavailable. The general methods used to support the risk-informed evaluations are based on RG 1.174 and RG 1.177. In performing the evaluation, two conditions were assumed:

a) A condition resulting in the inoperability of a system, which currently results in the need for an immediate shutdown, is an infrequent event. This is evidenced by the fact that plant shutdowns due to entries into these TS are rare. Furthermore, when this condition does arise, the actual cause of the inoperability is often due to an incomplete operability paper trail or a partial system failure rather than a deleterious common-cause failure of components leading to a functional failure of the entire system.

and,

b) The risk incurred by increasing the required shutdown CT may be controlled to acceptable levels using a risk-informed approach that considers the component risk worth and offsetting benefits of avoiding plant transitions.

The risk impact of the proposed TS changes was assessed following the three-tiered approach, recommended in RG 1.177, for evaluating proposed extensions in current CTs:

a) The first tier involves the assessment of the change in plant risk due to the proposed TS change. Such risk change is expressed (1) by the change in the average yearly core damage frequency (ΔCDF) and the average yearly large early release frequency (ΔLERF) and (2) by ICCDP and the ICLERP. The assessed ΔCDF and ΔLERF values are compared to acceptance guidelines, consistent with the Commission's Safety Goal Policy Statement as documented in RG 1.174, so that the plant's average baseline risk is maintained within a minimal range. The assessed ICCDP and ICLERP values are compared to acceptance guidelines provided in RG 1.177, which aim at ensuring that the plant risk does not increase unacceptably during the period the equipment is declared inoperable. Since three of the TS systems (whose function is to mitigate the consequences from radiation release other than large early release) considered in this analysis, do not directly impact CDF and LERF, appropriate risk measures (similar to ΔLERF and ICLERP) and acceptance criteria were introduced for these systems.

b) The second tier involves the identification of potentially high-risk configurations that could exist if equipment, in addition to that associated with the change, were to be declared inoperable simultaneously, or other risk-significant operational factors such as concurrent equipment testing were also involved. The objective is to ensure that appropriate restrictions are in place to avoid any potential high-risk configurations.

c) The third tier involves the establishment of an overall configuration risk management program (CRMP) to ensure that potentially risk-significant configurations resulting from maintenance and other operational activities are identified. The objective of the CRMP is to manage configuration-specific risk by appropriate scheduling of plant activities and/or appropriate compensatory measures.

The three-tiered approach and associated requirements discussed in Section 3 provide assurance that inoperable conditions have been analyzed and potential high risk configurations identified and controlled without the need for additional TS requirements. Compensating provisions, which are intended to support defense-in-depth considerations, will be incorporated into plant procedures, if deemed appropriate.

3.1 Risk Impact Measures and Acceptance Criteria

The guidance provided in RG 1.177 addresses only systems/components contributing to CDF and/or LERF. However, for the systems considered in this analysis, which have no direct impact on CDF and LERF, the philosophy of the three-tiered approach was extended to encompass TS changes involving systems that mitigate the consequences from radiation release other than large early release. For this purpose, appropriate risk measures (similar to ΔLERF and ICLERP) and acceptance criteria were introduced for systems whose function is to mitigate the consequences from radiation release other than large early release.

For the analysis of the RCS Leakage Detection Instrumentation, the ICCDP associated with the proposed extension of the time interval to restore the inoperable system is expressed by the following equation:

$$ICCDP = \Delta R_{CDF} \times d = (R_{1,CDF} - R_{0,CDF}) \times d$$

where:

ΔR_{CDF} = the conditional risk increase, in terms of CDF, caused by the specified system's unavailability,

d = the proposed extension of the time interval during which the plant is allowed to keep operating at power given the condition,

$R_{1,CDF}$ = the plant CDF with the system permanently unavailable,

$R_{0,CDF}$ = the plant CDF without the proposed time extension.

A similar expression is used for ICLERP by substituting the appropriate measure of risk, i.e., LERF instead of CDF.

$$ICLERP = \Delta R_{LERF} \times d = (R_{1,LERF} - R_{0,LERF}) \times d$$

where:

ΔR_{LERF} = the conditional risk increase, in terms of LERF, caused by the specified system's unavailability,

d = the proposed extension of the time interval during which the plant is allowed to keep operating at power given the condition,

$R_{1,LERF}$ = the plant LERF with the system permanently unavailable,

$R_{0,LERF}$ = the plant LERF without the proposed time extension.

The change in CDF (i.e., ΔCDF) and LERF (i.e., ΔLERF) for each system is obtained by multiplying the respective ICCDP and ICLERP values by the yearly frequency, f, the frequency the system is expected to be declared inoperable:

$$\Delta CDF = ICCDP \times f$$

$$\Delta LERF = ICLERP \times f$$

The risk impact measures adopted for the analysis of the SGT System, MCREC System, and Control Room AC System are: (1) the incremental conditional radiation release (above system design limits) probability, ICRRP, and (2) the change in the radiation release (above system design limits) frequency, ΔRRF. A similar expression as the ones used for ICCDP and ICLERP can be used for ICRRP by substituting the appropriate measure of risk, i.e., radiation release (above system design limits) frequency (RRF) instead of CDF:

$$ICRRP = \Delta R_{RRF} \times d = (R_{1,RRF} - R_{0,RRF}) \times d$$

where:

ΔR_{RRF} = the conditional risk increase, in terms of RRF, caused by the specified system's unavailability,

d = the proposed extension of the time interval during which the plant is allowed to keep operating at power given the condition,

$R_{1,RRF}$ = the plant RRF with the system permanently unavailable,

$R_{0,RRF}$ = the plant RRF without the proposed time extension.

The change in RRF (i.e., ΔRRF) for each system is obtained by multiplying the respective ICRRP value by the yearly frequency, f, the system at which is expected to be declared inoperable:

$$\Delta RRF = ICRRP \times f$$

The assessed ICRRP and ΔRRF values are compared to acceptance criteria similar to those included in RG 1.177 and RG 1.174 for core damage and large early release risks, respectively. The results of the risk assessments, in terms of the various risk measures, and their comparison to acceptance criteria are discussed in Section 4.

The acceptance criteria for core damage and large early release risks are based on guidance provided in RG 1.174 and RG 1.177. RG 1.174 indicates that a ΔCDF smaller than 1.0E-6/year and a ΔLERF smaller than 1.0E-7/year are considered very small. Acceptance guidelines provided in RG 1.177 for evaluating the core damage and large early release risks associated with a "single CT entry" are also considered. These guidelines, which are based on traditionally acceptable levels of risk increases during equipment outages for maintenance activities, indicate that an ICCDP smaller than 5.0 E-7/year and an ICLERP smaller than 5.0 E-8/year are considered very small.

Acceptance criteria for radiation release risks other than large early release risks are defined for use in the evaluation of the SGT System, MCREC System, and Control Room AC System. It is conservatively assumed that a ΔRRF value smaller than 1.0 E-7 per year (i.e., the same as for a large release) is considered very small and, therefore, acceptable. In addition, in order to ensure that the acceptance criterion for ΔRRF will be met, the ICRRP value for each entry is required to be smaller than 5.0 E-7 (i.e., the same value used in the criterion for ICCDP). It should be noted that the conservative acceptance criteria for radiation release risks, other than large early release risks, are introduced for the purposes of this evaluation and should not be generalized or interpreted for other risk-informed applications.

3.2 Identification of Potentially High Risk Configurations

The second tier of the three-tiered approach recommended in RG 1.177 involves the identification of potentially high-risk configurations that could exist if equipment, in addition to that associated with the TS change, were to be declared inoperable simultaneously. Insights from the risk assessments, in conjunction with important assumptions made in the analysis and defense-in-depth considerations, were used to identify such configurations. If potential high-risk configurations are identified, specific restrictions to the implementation of the proposed TS changes will be given.

3.3 Configuration Risk Management

The third tier of the three-tiered approach recommended in RG 1.177 involves the establishment of an overall CRMP to ensure that potentially risk-significant configurations resulting from maintenance and other operational activities are identified. The objective of the CRMP is to manage configuration-specific risk by appropriate scheduling of plant activities and/or appropriate compensatory measures. This objective is met by licensee programs, which comply with the Maintenance Rule 10 CFR 50.65 (a)(4) requirement to assess and manage risk resulting from maintenance and other operational activities. These programs can support licensee decision-making regarding the appropriate actions to control risk whenever a risk-informed TS is entered.

4.0 RISK ASSESSMENT

The risk assessment approach, documented in Section 3, was applied to the specific TS listed in Table 2-1. The following are the results of the risk assessments.

4.1 Systems Contributing to Core Damage and Large Early Release Risks

The assessed core damage and large early release risk impacts for the RCS Leakage Detection Instrumentation are summarized in Table 4-1 for two options. The first option is for plants having a CDF ≤ 2.5E-05/year. The second option is for plants having a CDF ≤ 1.0E-04/year.

One of the main purposes of the Reactor Coolant System (RCS) Leakage Detection Instrumentation is to provide an early indication of pipe crack. A small leak could be an indicator of a future more serious break developing in the RCS. Shutting down the plant would allow repair of the leak before it becomes a more serious break in the RCS. The analysis considered the change in CDF and LERF resulting from the potential increase in LOCA frequency when the RCS Leakage Detection Instrumentation is inoperable during the proposed CT. A bounding value of 20% was used for the contribution of all LOCAs to the CDF. The CDF due to LOCAs was then increased by a factor of 3 to account for a LOCA that could have been avoided if the RCS Leakage Detection Instrumentation subsystems were available. This factor increase is considered conservative since it is very unlikely that a leak that occurs somewhere in the proposed CT will actually progress in this short time period to a LOCA, particularly a medium or large LOCA.

A conservative CDF value of 2.5.0E-05/year was also assumed for Option 1. The CDF of 2.5E-05/year is considered conservative since the CDF for a majority of BWR plant are significantly less that this value. In fact, the CDF for the majority of BWR plants is less than 5E-06/year. If an individual plant cannot justify a CDF of 2.5E-05/year, a second option is provided. Option 2 assumes a bounding value of 1.0E-04/year, which can be expected to bound all remaining BWR plants. Using the above bounding values, the resulting challenge frequency ($\Delta R_{CDF/yr}$) due to the RCS Leakage Detection Instrumentation unavailability is 1.0E-5/year for Option 1 and 4.0E-05/year for Option 2.

The Incremental Conditional Core Damage Probability (ICCDP) given in the fourth column of Table 4-1 for both options is the product of ΔR_{CDF} and the proposed CT to make repairs. The change in core damage frequency (fifth and sixth columns for both options) is the product of the ICCDP and the yearly frequency that the RCS Leakage Detection Instrumentation is declared inoperable. A TS entry for this inoperable condition can be expected to be a very infrequent event. A conservative value for entry into this condition of once every 5 years was used for the base case analysis. In addition, to check the sensitivity of this value, the base case value was increased to once every 3 years. This approach is consistent with the approach used in the NRC approved analysis performed for the Combustion Engineering plants (Reference 2).

CLERP (seventh column of both options) is the fraction of core damage events that lead to a large early release. For this analysis, 10% is used as a bounding value. The 10% value is consistent with the highest CDF and LERF values from BWR plant Probabilistic Risk Assessments (PRAs). In addition, the value is consistent with NRC Safety Goals for fraction of core damage events that lead to a large early release. The remaining risk matrices (ICLERP and ΔLERF/yr for base and sensitivity cases) are similar to those calculated for core damage risks.

The results from Table 4-1 for both options indicate the ICCDP and ICLERP values are within the RG 1.177 acceptance guidelines (5E-07 and 5E-08, respectively). In addition, the assessed base and sensitivity case ΔCDF and ΔLERF/yr values are within the acceptance guidelines (1.0E-06/yr and 1.0E-07/yr, respectively) given in the Commission's Safety Goal Policy Statement as documented in RG 1.174. No additional sensitivity analyses are necessary due to the conservative values used in the analysis and the expected reduction in risks due to the avoidance of the transition to plant shutdown, which are not included in the analysis. It should be noted that only internal events are considered in estimating a system's challenge frequency. However, the risk assessment results would not be significantly different to impact any conclusions had external events been considered. The primary reason for this is the use of conservative values for the system's challenge frequency. The total internal event CDF is used for an estimate of the challenge frequency. This is conservative since not all core damage events lead to releases. In addition, the challenge frequency estimate (CDF) of 2.5E-05/year used for Option 1 is a factor of 2 higher than the CDF calculated in most BWR PRAs. A survey of BWR PRAs indicates the calculated CDF is less than or equal to 1.0E-05/year for 75% of the 28 plants reporting. The CDF used for Option 2 (1.0E-04/year) is even more conservative than the Option 1 CDF and is a bounding CDF for all BWR plants. Also, the proposed TS changes will be implemented with the incorporation of applicable compensating provisions into plant procedures. Based on these conservative assumptions and values used in the analysis, the results can be expected to apply to all initiating events, including external events.

Table 4-1 Core Damage and Large Early Release Risk Impact Results

Option 1 – Plants Having CDF ≤ 2.5E-05/Year

System	Proposed Completion Time (CT) (Days)	Challenge Frequency/yr. (ΔR_{CDF}/yr)[1]	ICCDP [2]	ΔCDF/yr (f = 1/5 per year)[3] Base Case	ΔCDF/yr (f = 1/3 per year)[3] Sensitivity Case	CLERP [4]	ΔR_{LERF}/yr [5]	ICLERP [6]	ΔLERF/yr[7] (f=1/5 per year) Base Case	ΔLERF/yr[7] (f=1/3 per year) Sensitivity Case
Reactor Coolant System (RCS) Leakage Detection Instrumentation	7	1.0E-05	1.9E-07	3.8E-08	6.4E-08	0.1	1.0E-06	1.9E-08	3.8E-09	6.4E-09

Option 2 – Plants Having CDF ≤ 1.0E-04/Year

System	Proposed Completion Time (CT) (Days)	Challenge Frequency/yr. (ΔR_{CDF}/yr)[1]	ICCDP [2]	ΔCDF/yr (f = 1/5 per year)[3] Base Case	ΔCDF/yr (f = 1/3 per year)[3] Sensitivity Case	CLERP [4]	ΔR_{LERF}/yr [5]	ICLERP [6]	ΔLERF/yr[7] (f=1/5 per year) Base Case	ΔLERF/yr[7] (f=1/3 per year) Sensitivity Case
Reactor Coolant System (RCS) Leakage Detection Instrumentation	1	4.0E-05	1.1E-07	2.2E-08	3.7E-08	0.1	4.0E-06	1.1E-08	2.2E-09	3.7E-09

Table 4-1 Notes:

(1) ΔR_{CDF}/yr = Conditional Core Damage Frequency Increase
(2) ICCDP = Incremental Conditional Core Damage Probability, Acceptance criterion: ICCDP<5.0E-7
(3) ΔCDF/yr = Change in Core Damage Frequency, Acceptance criterion: <1.0E-6/year
(4) CLERP = Conditional Large Early Release Probability
(5) ΔR_{LERF}/yr = Conditional Large Early Release Frequency Increase
(6) ICLERP = Incremental Conditional Large Early Release Probability, Acceptance criterion: ICLERP<5.0E-8
(7) ΔLERF/yr = Change in Large Early Release Frequency, Acceptance criterion: <1.0E-7/year

4.2 Systems Contributing to Radiation Release (Non-LER) Risk

The assessed risk impacts for the SGT System, MCREC System, and Control Room AC System, which contribute to non-LER, are summarized in Table 4-2 for two options. The first option is for plants having a CDF ≤ 2.5E-05/year. The second option is for plants having a CDF ≤ 1.0E-04/year.

The analysis values apply to all three systems. There are no system unique analysis values. No sensitivity analyses were necessary for systems and components contributing to non-LER due to the conservative assumptions used in the analysis in conjunction with the conservative interpretation of the risks associated with such systems and components.

Table 4-2 summarizes the risk impact, in terms of radiation release frequency change (ΔRRF), for each of the proposed TS changes related to systems contributing to radiation release (non-LER). Availability of such equipment is typically required to meet design basis dose limits.

The first column for each option lists the systems for which a TS change is proposed. The second column for each option lists the new proposed CT to restore the system's function. The third column for each option is the conditional radiation release (non-LER) risk increase, ΔR_{RRF}, caused by the system's loss of function (conservatively assumed to be challenged for sure during a core damage event). The fourth column of each option lists the ICRRP values for continued plant operation at power for the entire proposed CT given loss of the system's function. The ICRRP values are obtained by multiplying the proposed CT value (column 2) by ΔR_{RRF} (column 3). The last two columns for each option list the assessed average expected RRF changes, ΔRRF, associated with the proposed CT extensions, for two different loss of function frequencies (i.e., the base case frequency of once every five years and a sensitivity case of once every three years). The ΔRRF values are obtained by multiplying the corresponding ICRRP value by the average frequency of loss of function (i.e., by 1/5 and 1/3, respectively).

For purposes of this analysis, the same conservative CDF values of 2.5E-05/year and 1.0E-04/year, similar to that used in the analysis given in the previous section, were assumed for the conditional radiation release risk increase, ΔR_{RRF} for Options 1 and 2.

The assessed ICRRP values (fourth column) are within the acceptance guidelines for radiation release risks (< 5.0E-07) for both options. The base case analysis for a loss of function event occurring once every 5 years is also within acceptance guidelines for ΔRRF/year (1.0E-07/yr) for both options. For the sensitivity case of one event in every 3 years, the ΔRRF/year for Option 1 is very near the acceptance guidelines. For Option 2, the ΔRRF/year is within the acceptance guidelines. Such acceptance guidelines are discussed in Section 3.1 where conservative acceptance criteria for radiation release risks, other than large early release risks, are defined in analogy to the criteria documented in RG 1.174 and RG 1.177 for CDF and LERF (i.e., 1 E-07 per year for ΔRRF and 5E-07 for ICRRP). All the proposed changes meet the acceptance criteria. Additional sensitivity analyses were not necessary for systems contributing to radiation releases (non-LER) due to the conservative assumptions used in the analysis in conjunction with the conservative interpretation of the risks associated with such systems and components.

Table 4-2

Radiation Release (Non-LER) Risk Impact Results

Option 1 – Plants Having CDF ≤ 2.5E-05/Year

System	Proposed Completion Time (CT) (Days)	Conditional Radiation Release Risk Increase or Challenge Frequency/year (ΔR_{RRF})(2)	ICRRP(3)	ΔRRF/yr (4) (f = 1/5 per year) Base Case	ΔRRF/yr (4) (f = 1/3 per year) Sensitivity Case
Standby Gas Treatment (SGT) System	7	2.5E-05	4.8E-07	9.6E-08	1.6E-07
Main Control Room Environmental Control (MCREC) System(1)	7	2.5E-05	4.8E-07	9.6E-08	1.6E-07
Control Room Air Conditioning (AC) System	7	2.5E-05	4.8E-07	9.6E-08	1.6E-07

Option 2 – Plants Having CDF ≤ 1.0E-04/Year

System	Proposed Completion Time (CT) (Days)	Conditional Radiation Release Risk Increase or Challenge Frequency/year (ΔR_{RRF})(2)	ICRRP(3)	ΔRRF/yr (4) (f = 1/5 per year) Base Case	ΔRRF/yr (4) (f = 1/3 per year) Sensitivity Case
Standby Gas Treatment (SGT) System	1	1.0E-04	2.7E-07	5.5E-08	9.1E-08
Main Control Room Environmental Control (MCREC) System(1)	1	1.0E-04	2.7E-07	5.5E-08	9.1E-08
Control Room Air Conditioning (AC) System	1	1.0E-04	2.7E-07	5.5E-08	9.1E-08

Table 4-2 Notes:

(1) In the BWR 6 STS, this system is called Control Room Fresh Air (CRFA) System. The MCREC and CRFA Systems both perform the same function.

(2) ΔR_{RRF} = Conditional Radiation Release Increase Frequency

(3) ICRRP = Incremental Conditional Radiation Release Probability. Acceptance criterion: ICRRP < 5.0E-07.

(4) Acceptance criterion: ΔRRF/year < 1.0E-07/yr.

5.0 SYSTEM EVALUATION

This section provides a summary of the basis for change for each of the proposed risk-informed TS. The format of each of the subsequent subsections is the same format used in the approved WOG report (Reference 1). The format is as follows:

a) Description
b) Plant Applicability (Only Modes 1, 2, and 3 are addressed in this evaluation)
c) Limiting Condition for Operation (LCO)
d) Licensing Basis for LCO
e) Condition Requiring Entry into Shutdown Action Statement
f) Proposed Modification to Shutdown Required Actions
g) Basis for Proposed Change
h) Defense-in-Depth Considerations
i) Compensating Provisions
j) Tier 2 Restrictions

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 CTs when a system is inoperable. The modifications are consistent with the same basic principles established in TS for dealing with inoperable equipment. It is, therefore, concluded that the proposed changes to CTs are in compliance with current licensing regulations.

In performing the defense-in-depth assessment, it is assumed that the purpose of the TS Required Action to enter shutdown is to complete a short duration repair of the component under consideration. Since the TS changes being discussed generally are associated with the inoperability of an entire system (or unavailability of a given function), defense-in-depth is not maintained in the sense of assuming equipment redundancy. Instead, public safety is maintained by ensuring public risk is acceptably low and by providing an opportunity to repair equipment on-line thereby potentially avoiding additional risk of plant transitions. A more detailed discussion of defense-in-depth considerations is provided in Sections 5.1 through 5.4.

Safety margins are not reduced by implementation of the proposed changes. The proposed changes to CTs are expected to result in an overall risk reduction due to the avoidance of the transition to plant shutdown.

This section provides an integrated discussion of the risk and deterministic issues, focusing on specific TS. The CT extensions discussed in this section do not impact core damage or large early release probabilities. These systems have a variety of functions. These functions include alerting operators of containment leakage outside of acceptable limits, meeting design basis dose assessments, and maintaining control room habitability following an accident. A quantitative assessment of the impact of the unavailability of these systems is presented in Section 3.

The recommended CT is intended to provide the operating staff additional time to resolve inoperability while the plant remains at power. Expeditious resolution of the inoperability at power reduces the overall safety risk by avoiding the transition risks associated with plant shutdown. In many instances, the proposed CT alters the plant response to situations that place the plant outside of the design basis.

5.1 Reactor Coolant System (RCS) Leakage Detection Instrumentation (LCO 3.4.6 - BWR 4 STS and LCO 3.4.7 - BWR 6 STS)

Description: Leakage from the reactor coolant pressure boundary (RCPB) inside the drywell is detected by at least one of two or three independently monitored variables, such as sump level changes, and drywell gaseous and particulate radioactivity levels. The primary means of quantifying leakage in the drywell is the drywell floor drain sump monitoring system. The primary containment air monitoring systems and air cooler condensate flow rate monitoring system serves as an added indicator of leakage.

Plant Applicability: Almost all BWRs have similar systems. These systems have a similar function to the RCS Leakage Detection Instrumentation, but may be designated by a different name.

Typical Limiting Condition for Operation (LCO): The following RCS leakage detection instrumentation shall be operable in Modes 1, 2, and 3:

a) Drywell floor drain sump monitoring system; and
b) One channel of either primary containment atmospheric particulate or atmospheric gaseous monitoring system; and
c) Primary containment air cooler condensate flow rate monitoring system.

The LCO for some BWR plants do not include all three types of leak detection instrumentation.

Licensing Basis for LCO: GDC 30 of 10 CFR 50, Appendix A requires means for detecting and, to the extent practical, identifying the location of the source of RCS leakage. Limits on leakage from the RCPB are required so that appropriate action can be taken before the integrity of the RCPB is impaired. Leakage detection systems for the RCS are provided to alert the operators when leakage rates above normal background levels are detected and also to supply quantitative measurement of leakage rates.

Condition Requiring Entry into Shutdown Action Statement: Entry into LCO 3.0.3 is required when all required leakage detection instrumentation systems are inoperable (LCO Condition F).

Proposed Modification to Shutdown Required Actions: Option 1: For plants having a CDF ≤ 2.5E-05/year, revise the Required Actions to allow seven days to restore one of the RCS Leakage Detection Instrumentation subsystems. Option 2: For plants having a CDF ≤ 1.0E-04/year, revise the Required Actions to allow one day to restore one of the RCS Leakage Detection Instrumentation subsystems.

Basis for Proposed Change: The risk-informed CT is based on the methodology described in Section 3.1. Since one of the main purposes of the RCS Leakage Detection Instrumentation is to detect the potential of an oncoming LOCA, the analysis considered the frequency of a LOCA during the proposed CT. The results of the impact on CDF and LERF when the RCS Leakage Detection Instrumentation is declared inoperable during the proposed CT is provided in Table 4-1 for each option. The results indicate the ICCDP and ICLERP values are the within the RG 1.177 acceptance guidelines (5E-07 and 5E-08, respectively) for both options. In addition, the assessed base and sensitivity case ΔCDF and ΔLERF/yr values are within the acceptance guidelines (1.0E-06/yr and 1.0E-07/yr, respectively) given in the Commission's Safety Goal Policy Statement as documented in RG 1.174 for both options. No additional sensitivity analyses are necessary due to the conservative values used in the analysis and the expected reduction in risks due to the avoidance of the transition to plant shutdown which are not included in the analysis.

The risk-informed assessment results indicate that the proposed CT for restoring one of the RCS Leakage Detection Instrumentation subsystems will not lead to a significant increase in risk and may actually decrease risk by avoiding the risk associated with the transition to shutdown.

Defense-in-Depth Considerations: Leakage detection subsystems for the RCS alert the operators when leakage rates above normal background levels are detected provide an early indication of a potential break in the RCS. The probability of a RCS leak leading to break during the allowed CT before shutdown is low. Assuming, as a worst case, that a break does occur during the CT, the designed safety systems will bring the plant to safe shutdown. In addition, other compensating actions, discussed below, can be taken during the CT to reduce the potential of a leak ever progressing to a LOCA condition.

Compensating Provisions: Several actions can be taken to reduce the potential of a leak ever progressing to a LOCA condition. The drywell floor drain sump pumps cycle on and off using limit switches, which are independent of the RCS Leakage Detection Instrumentation. Any cycling of the drywell floor sump pumps could be monitored in the control room and would alert the operator of a leakage in the drywell. The leakage of other equipment room drains could also be monitored for local leakage. In addition, temperature and pressure within the containment, which is monitored in the control room, would be another indicator of a leak within the drywell. A lowering of the water level in the drywell air cooler surge tank would be an indicator of high condensate flow. These actions are intended as only examples that could be taken while the RCS Leakage Detection Instrumentation is inoperable. Other actions not stated here may be possible. In addition, actions could differ from plant to plant based on configuration and equipment differences. Actions will be incorporated into plant procedures, if deemed appropriate.

Tier 2 Restrictions: None

5.2 Standby Gas Treatment (SGT) System (LCO 3.6.4.3 - BWR 4 and 6 STS)

Description: The SGT System consists of two fully redundant subsystems, each with its own set of ductwork, dampers, charcoal filter train, and controls. The function of the SGT System during Modes 1, 2, and 3 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 absorbed prior to exhausting to the environment. In addition, the SGT System maintains the reactor-building (secondary containment) atmosphere at a negative pressure. The SGT System is not designed for significant containment leakage or high steam environment.

Plant Applicability: All BWRs.

Limiting Condition for Operation (LCO): Two SGT subsystems shall be operable during Modes 1, 2, and 3.

Typical Licensing Basis for LCO: The SGT System is required by CFR 50, Appendix A, GDC 41, "Containment Atmosphere Cleanup". The design basis for the SGT System is to mitigate the consequences of a loss of coolant accident and fuel handling accidents. For all events analyzed, the SGT System is automatically initiated to reduce, via filtration and adsorption, the radioactive material released to the environment. The sizing of the SGT system equipment and components is based on the results of an infiltration analysis, as well as an exfiltration analysis of the auxiliary and enclosure building structures. The internal pressure of the SGT System boundary region is maintained at a negative pressure of 0.25 inches water gauge when the system is in operation.

Condition Requiring Entry into Shutdown Action Statement: Entry into LCO 3.0.3 is required when two SGT subsystems are inoperable (LCO Condition D).

Proposed Modification to Shutdown Required Actions: Option 1: For plants having a CDF ≤ 2.5E-05/year, revise the Required Actions to allow seven days to restore one of the SGT subsystems. Option 2: For plants having a CDF ≤ 1.0E-04/year, revise the Required Actions to allow one day to restore one of the SGT subsystems.

Basis for Proposed Change: The risk-informed CT is based on the methodology described in Section 3.1. The risk-informed assessment results indicate that the proposed CT for restoring one SGT subsystem will not lead to a significant increase in risk and may actually decrease risk by avoiding the risk associated with the transition to shutdown. The proposed CT will not contribute to any risk increases, in terms of core damage and large early release. The radiation release "Non-LER" risk impact associated with the proposed time increase was conservatively assessed in Section 4.0. Specifically, the proposed CT would lead to the following "Non-LER" risk increases: (1) the probability of a "Non-LER" release during the proposed CT would increase by about

4.8E-7 for Option 1 and 2.7E-07 for Option 2; and (2) the "non-LER" frequency would increase by about 9.6E-8/year for Option 1 and 5.5E-08/year for Option 2. These increases in "Non-LER" risk, which are comparable in magnitude to what is considered acceptable for core damage and large early release risk increases, are very small. Furthermore, the proposed time extension is definitely risk-beneficial when the averted core damage and large early release risks associated with avoiding plant shutdown are taken into consideration.

Defense-in-Depth Considerations: The SGT System is required to ensure that the radioactive material leaking from the primary containment into the secondary containment following a DBA is filtered and absorbed prior to exhausting to the environment. Loss of the SGT System could cause site boundary doses, in the event of a DBA, to exceed the values given in the licensing basis. However, containment leakage at or near design basis levels, where the SGT would be effective, is not a significant risk contributor. For releases outside design basis levels, the SGT System would have very little effect and, therefore, would not change the overall risks calculated in PRAs. In addition, other compensating actions, discussed below, can be taken during the CT to reduce the potential of a small radiation leak.

Compensating Provisions: While the SGT System is inoperable during the proposed CT, any small leaks of radiation could be monitored in the secondary containment during the inoperable period and plant shutdown initiated for leaks outside of limits. Other compensating actions may be possible based on the plant's configuration and available monitoring devices. Actions will be incorporated into plant procedures, if deemed appropriate.

Tier 2 Restrictions: None

5.3 Main Control Room Environmental Control (MCREC) System (LCO 3.7.4 - BWR 4 STS) or Control Room Fresh Air (CRFA) System (LCO 3.7.3 - BWR 6 STS)

The following evaluation applies to the MCREC System, as well as to the CRFA System.

Description: The function of MCREC System includes two independent and redundant high efficiency air filtration subsystems for emergency treatment of recirculated air or outside supply air. In addition to the safety-related standby emergency filtration function, parts of the MCREC System may operate to maintain the control room environment during normal operation. Upon receipt of the initiation signals (indicative of conditions that could result in radiation exposure to control room personnel), the MCREC System automatically switches to the isolation and pressurization mode of operation to prevent infiltration of contaminated air into the control room.

Plant Applicability: Almost all BWRs have similar systems. These systems have a similar function to the MCREC System, but may be designated by a different name.

Limiting Condition for Operation (LCO): Two MCREC subsystems shall be operable during Modes 1, 2, and 3.

Typical Licensing Basis for LCO: The MCREC System is designed to maintain the control room environment for a 30-day continuous occupancy after a DBA without exceeding 5 rem whole body dose or its equivalent to any part of the body.

Condition Requiring Entry into Shutdown Action Statement: Entry into LCO 3.0.3 is required when two MCREC subsystems are inoperable other than due to inoperable control room boundary (LCO Condition E).

Proposed Modification to Shutdown Required Actions: Option 1: For plants having a CDF ≤ 2.5E-05/year, revise the Required Actions to allow seven days to restore one of the MCREC subsystems. Option 2: For plants having a CDF ≤ 1.0E-04/year, revise the Required Actions to allow one day to restore one of the MCREC subsystems.

Basis for Proposed Change: The risk-informed CT is based on the methodology described in Section 3.1. The risk-informed assessment results indicate that the proposed CT for restoring one MCREC subsystem will not lead to a significant increase in risk and may actually decrease risk by avoiding the risk associated with the transition to shutdown. The proposed CT will not contribute to any risk increases, in terms of core damage and large early release. The radiation release "Non-LER" risk impact associated with the proposed time increase was conservatively assessed in Section 4.0. Specifically, the proposed CT would lead to the following "Non-LER" risk increases: (1) the probability of a "Non-LER" release during the proposed CT would increase by about 4.8E-07 for Option 1 and 2.7E-07 for Option 2; and (2) the "non-LER" frequency would increase by about 9.6E-8/year for Option 1 and 5.5E-08/year for Option 2. These increases in "Non-LER" risk, which are comparable in magnitude to what is considered acceptable for core damage and large early release risk increases, are very small. Furthermore, the proposed time extension is definitely risk beneficial when the averted core damage and large early release risks associated with avoiding plant shutdown are taken into consideration.

Defense-in-Depth Considerations: The MCREC System provides a protected environment from which operators can control the plant following an uncontrolled release of radioactivity, chemicals or toxic gas. The MCREC System is needed to protect the control room in a wide variety of circumstances. The current TS require operability of two subsystems of MCREC System from Mode 1, 2, and 3 to support operator response to a DBA. An extension of the short-term shutdown requirement is based on the low risk of system inoperability compared to the associated risks of plant shutdown. In addition, several short-term actions associated with maintaining the control room environment may be implemented to mitigate risk consequences further. This includes the use of respiratory units, control room pressurization systems, and the control of leakage pathways.

Compensating Provisions: Respiratory units and control room pressurization systems can be put into place. Control of leakage pathways can be put into place. Alternate shutdown panels and local shutdown stations can be utilized if necessary. Other compensating actions may be possible based on the plant's configuration and available monitoring devices. Actions will be incorporated into plant procedures, if deemed appropriate.

Tier 2 Restrictions: None

5.4 Control Room Air Conditioning (AC) System (LCO 3.7.5 - BWR 4 STS)

Description: The Control Room AC System provides temperature control for the control room following isolation of the control room. The system consists of two independent, redundant subsystems that provide cooling and heating of recirculated control room air. The system is designed to provide a controlled environment under both normal and accident conditions. The system is capable of removing sensible and latent heat loads from the control room, including consideration of equipment heat loads and personnel occupancy requirements to ensure equipment operability.

Plant Applicability: All BWRs except BWR 6 plants. Some BWRs have reduced redundancy.

Limiting Condition for Operation (LCO): Two Control Room AC subsystems shall be operable during Modes 1, 2, and 3.

Typical Licensing Basis for LCO: The design basis of the Control Room AC System is to maintain the control room temperature for a 30-day continuous occupancy. A single subsystem is required to maintain a suitable control room environment for a sustained occupancy of 12 persons.

Condition Requiring Entry into Shutdown Action Statement: Entry into LCO 3.0.3 is required when two Control Room AC subsystems are inoperable (LCO Condition D).

Proposed Modification to Shutdown Required Actions: Option 1: For plants having a CDF ≤ 2.5E-05/year, revise the Required Actions to allow seven days to restore one of the Control Room AC subsystems. Option 2: For plants having a CDF ≤ 1.0E-04/year, revise the Required Actions to allow one day to restore one of the Control Room AC subsystems.

Basis for Proposed Change: The risk-informed CT is based on the methodology described in Section 3.1. The risk-informed assessment results indicate that the proposed CT for restoring one Control Room AC subsystem will not lead to a significant increase in risk and may actually decrease risk by avoiding the risk associated with the transition to shutdown. The proposed CT will not contribute to any risk increases, in terms of core damage and large early release. The radiation release "Non-LER" risk impact associated with the proposed time increase was conservatively assessed in Section 4.0. Specifically, the proposed CT would lead to the following "Non-LER" risk increases: (1) the probability of a "Non-LER" release during the proposed CT would increase by about 4.8E-07 for Option 1 and 2.7E-07 for Option 2; and (2) the "non-LER" frequency would increase by about 9.6E-8/year for Option 1 and 5.5E-08/year for Option 2. These increases in "Non-LER" risk, which are comparable in magnitude to what is considered acceptable for core damage and large early release risk increases, are very small. Furthermore, the proposed time extension is definitely risk beneficial when the averted core damage and large early release risks associated with avoiding plant shutdown are taken into consideration.

Defense-in-Depth Considerations: The Control Room AC System provides a protected environment from which operators can control the plant following an isolation of the control room. The Control Room AC System is needed to protect the control room in a wide variety of circumstances. The current TS require operability of two subsystems of Control Room System from Mode 1, 2, and 3 to support operator response to a DBA. An extension of the short-term shutdown requirement is based on the low risk of system inoperability compared to the associated risks of plant shutdown. In addition, several short-term actions associated with cooling the control room may be implemented to mitigate risk consequences further. These actions include use of portable fans, portable cooling units, and propping open doors.

Compensating Provisions: Temperature can be periodically monitored in the control room. Temporary cooling may also be established via use of portable fans or coolers, propping open doors, or similar actions. Also, alternate shutdown panels and local shutdown stations can be used if necessary. Other compensating actions may be possible based on the plant's configuration and available monitoring devices. Actions will be incorporated into plant procedures, if deemed appropriate.

Tier 2 Restrictions: None

6.0 SUMMARY

This report justifies modifications to selected TS Required Action Statements for the conditions that result in a loss of function related to a system or component included within the scope of the plant TS. It is recommended that the current Required Action be changed from the LCO 3.0.3 entry to a risk-informed action based on the system's risk significance. The proposed change provides either a seven-day or a one-day (depending on the plant's CDF) CT to restore the system function for the selected TS conditions.

The proposed TS changes covered in this report are summarized in Table 2-1. These changes are risk-informed and are in conformance with RG 1.174 and RG 1.177, as appropriate. Risk assessments performed to support these modifications are based on a bounding analysis and are applicable to BWRs of participating utilities listed in Appendix A. Furthermore, risks associated with the implementation of these TS changes will be managed in accordance with paragraph a(4) of 10CFR50.65 Maintenance Rule (MR).

The benefit from these changes is that the proposed CT extensions provide needed flexibility in the performance of corrective maintenance of these components during power operation. These actions will avert the costs and risks associated with plant shutdowns and ensure that the public health and safety is preserved.

7.0 REFERENCES

1) WCAP-16125-NP-A, Revision 0, "Justification for Risk-Informed Modifications to Selected Technical Specifications for Conditions Leading to Exigent Plant Shutdown", August 2004.

2) Letter dated July 9, 2004, from William D. Beckner, NRC, to Gordon Bischoff, Westinghouse Electric Company, "Safety Evaluation of WCAP-16125-NP, Rev. 0, 'Justification for Risk-Informed Modifications to Selected Technical Specifications for Conditions Leading to Exigent Plant Shutdown', TAC No. MB1257", July 9, 2004.

3) Regulatory Guide 1.174, Rev 1, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," USNRC, November 2002.

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

5) NUREG-1433, Rev. 3.1, "Standard Technical Specifications, General Electric Plants, BWR /4", December 2005.

6) NUREG-1434, Rev. 3.1, "Standard Technical Specifications, General Electric Plants, BWR /6", December 2005.

Appendix A

PARTICIPATING UTILITIES

Table A-1

PARTICIPATING UTILITIES

Utility	Plant	BWR Type	Containment Type
AmerGen	Clinton	6	III
AmerGen	Oyster Creek	2	I
Constellation Energy Group	Nine Mile Point 1 Nine Mile Point 2	2 5	I II
DTE Energy	Fermi 2	4	I
Energy Northwest	Columbia Generating Station	5	II
Entergy	FitzPatrick	4	I
Entergy	Pilgrim	3	I
Entergy	Vermont Yankee	4	I
Entergy	River Bend Grand Gulf	6 6	III III
Exelon	Dresden 2 & 3 Quad Cities 1 & 2 LaSalle 1 & 2	3 3 5	I I II
Exelon	Peach Bottom 2 & 3 Limerick 1 & 2	4 4	I II
FirstEnergy	Perry 1	6	III
Nebraska Public Power District	Cooper	4	I
Nuclear Management Company	Duane Arnold	4	I
Nuclear Management Company	Monticello	3	I
PPL Susquehanna LLC	Susquehanna 1 & 2	4	II
Progress Energy	Brunswick 1 & 2	4	I
PSEG Nuclear	Hope Creek	4	I
Southern Company Nuclear	Hatch 1 & 2	4	I
Tennessee Valley Authority	Browns Ferry 1, 2 & 3	4	I