



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 16, 2016

Mr. Mark E. Reddemann
Chief Executive Officer
Energy Northwest
P.O. Box 968 (Mail Drop 1023)
Richland, WA 99352-0968

SUBJECT: COLUMBIA GENERATING STATION - ISSUANCE OF AMENDMENT RE:
LICENSE AMENDMENT REQUEST TO ADOPT TECHNICAL SPECIFICATION
TASK FORCE (TSTF)-427, "ALLOWANCE FOR NON TECHNICAL
SPECIFICATION BARRIER DEGRADATION ON SUPPORTED SYSTEM
OPERABILITY" AND REVISE LCO 3.0.8 FOR CONSISTENCY WITHIN THE
TECHNICAL SPECIFICATIONS (CAC NO. MF6682)

Dear Mr. Reddemann:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment No. 237 to Renewed Facility Operating License No. NPF-21 for the Columbia Generating Station (CGS). The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated September 2, 2015.

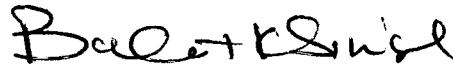
The amendment revises TS requirements for unavailable barriers by adding Limiting Condition for Operation (LCO) 3.0.9. The LCO allows a delay time for entering a supported system TS, when the inoperability is solely due to an unavailable barrier, if the risk is assessed and managed. The change is consistent with Technical Specification Task Force (TSTF)-427, Revision 2, "Allowance for Non Technical Specification Barrier Degradation Supported System OPERABILITY." Additionally, LCO 3.0.8 has been revised to replace the term "train" with "division" to be consistent with CGS's TS definition of "OPERABLE-OPERABILITY" and the terminology used in Section 1.3, "Completion Times" of the CGS TS.

M. Reddemann

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A copy of the related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,



Balwant K. Singal, Senior Project Manager
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosures:

1. Amendment No. 237 to NPF-21
2. Safety Evaluation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ENERGY NORTHWEST

DOCKET NO. 50-397

COLUMBIA GENERATING STATION

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 237
License No. NPF-21

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Energy Northwest (licensee), dated September 2, 2015, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-21 is hereby amended to read as follows:

- (2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 237 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The license amendment is effective as of its date of issuance and shall be implemented within 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Robert J. Pascarelli, Chief
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Renewed Facility
Operating License No. NPF-21
and Technical Specifications

Date of Issuance: February 16, 2016

ATTACHMENT TO LICENSE AMENDMENT NO. 237

RENEWED FACILITY OPERATING LICENSE NO. NPF-21

DOCKET NO. 50-397

Replace the following pages of the Renewed Facility Operating License No. NPF-21 and Appendix A, Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change.

Facility Operating License

REMOVE

INSERT

-4-

-4-

Technical Specification

REMOVE

INSERT

3.0-1

3.0-1

3.0-3

3.0-3

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 237 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

- a. For Surveillance Requirements (SRs) not previously performed by existing SRs or other plant tests, the requirement will be considered met on the implementation date and the next required test will be at the interval specified in the Technical Specifications as revised in Amendment No. 149.

(3) Deleted.

(4) Deleted.

(5) Deleted.

(6) Deleted.

(7) Deleted.

(8) Deleted.

(9) Deleted.

(10) Deleted.

(11) Shield Wall Deferral (Section 12.3.2, SSER #4, License Amendment #7)

The licensee shall complete construction of the deferred shield walls and window as identified in Attachment 3, as amended by this license amendment.

(12) Deleted.

(13) Deleted.

*The parenthetical notation following the title of many license conditions denotes the section of the Safety Evaluation Report and/or its supplements wherein the license condition is discussed.

3.0 LIMITING CONDITION FOR OPERATION (LCO) APPLICABILITY

LCO 3.0.1 LCOs shall be met during the MODES or other specified conditions in the Applicability, except as provided in LCO 3.0.2, LCO 3.0.7, LCO 3.0.8, and LCO 3.0.9.

LCO 3.0.2 Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met, except as provided in LCO 3.0.5 and LCO 3.0.6.

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

LCO 3.0.3 When an LCO is not met and the associated ACTIONS are not met, an associated ACTION is not provided, or if directed by the associated ACTIONS, the unit shall be placed in a MODE or other specified condition in which the LCO is not applicable. Action shall be initiated within 1 hour to place the unit, as applicable, in:

- a. MODE 2 within 7 hours;
- b. MODE 3 within 13 hours; and
- c. MODE 4 within 37 hours.

Exceptions to this Specification are stated in the individual Specifications.

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

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

LCO 3.0.4 When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall only be made:

- a. When the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time;
- b. After performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering the MODE or other specified condition in the Applicability, and establishment of risk management actions, if appropriate; exceptions to this Specification are stated in the individual Specifications, or

LCO Applicability

LCO 3.0.8 When one or more required snubbers are unable to perform their associated support function(s), any affected supported LCO(s) are not required to be declared not met solely for this reason if risk is assessed and managed, and:

- a. The snubbers not able to perform their associated support function(s) are associated with only one division or subsystem of a multiple division or subsystem supported system or are associated with a single division or subsystem supported system and are able to perform their associated support function within 72 hours; or
- b. The snubbers not able to perform their associated support function(s) are associated with more than one division or subsystem of a multiple division or subsystem supported system and are able to perform their associated support function within 12 hours.

At the end of the specified period the required snubbers must be able to perform their associated support function(s), or the affected supported system LCO(s) shall be declared not met.

LCO 3.0.9 When one or more required barriers are unable to perform their related support function(s), any supported system LCO(s) are not required to be declared not met solely for this reason for up to 30 days provided that at least one division or subsystem of the supported system is OPERABLE and supported by barriers capable of providing their related support function(s), and risk is assessed and managed. This specification may be concurrently applied to more than one division or subsystem of a multiple division or subsystem supported system provided at least one division or subsystem of the supported system is OPERABLE and the barriers supporting each of these divisions or subsystems provide their related support function(s) for different categories of initiating events.

For the purposes of this specification, the High Pressure Core Spray (HPCS) system, the Reactor Core Isolation Cooling (RCIC) system, and the Automatic Depressurization System (ADS) are considered independent subsystems of a single system.

If the required OPERABLE division or subsystem becomes inoperable while this specification is in use, it must be restored to OPERABLE status within 24 hours or the provisions of this specification cannot be applied to the divisions or subsystems supported by the barriers that cannot perform their related support function(s).

At the end of the specified period, the required barriers must be able to perform their related support function(s) or the supported system LCO(s) shall be declared not met.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 237 TO

RENEWED FACILITY OPERATING LICENSE NO. NPF-21

ENERGY NORTHWEST

COLUMBIA GENERATING STATION

DOCKET NO. 50-397

1.0 INTRODUCTION

By application dated September 2, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15245A777), Energy Northwest (the licensee) requested changes to the Technical Specifications (Appendix A to Renewed Facility Operating License No. NPF-21) for the Columbia Generating Station (CGS). The requested change would revise TS requirements for unavailable barriers by adding Limiting Condition for Operation (LCO) 3.0.9. The LCO allows a delay time for entering a supported system TS, when the inoperability is solely due to an unavailable barrier, if the risk is assessed and managed. The change is consistent with Technical Specification Task Force (TSTF), TSTF-427, Revision 2, "Allowance for Non Technical Specification Barrier Degradation Supported System OPERABILITY," (ADAMS Accession No. ML061240055). Additionally, LCO 3.0.8 would be revised to replace the term "train" with "division" to be consistent with CGS TS definition of "OPERABLE-OPERABILITY" and the terminology used in Section 1.3, "Completion Times," of CGS TS. LCO 3.0.1 has been revised to include reference to new LCO 3.0.9. The availability of this TS improvement was published in the *Federal Register* on October 3, 2006 (71 FR 58444), as part of the Consolidated Line Item Improvement Process.

On May 3, 2006, the industry owners group TSTF submitted a proposed change, TSTF-427, Revision 2, to the standard technical specifications (STSs)¹ on behalf of the industry (TSTF-427, Revisions 0 and 1 were prior draft iterations). TSTF-427, Revision 2, is a proposal to add an

¹ NUREG-1430, Volume 1, Revision 4.0, "Standard Technical Specifications, Babcock and Wilcox Plants," April 2012 (ADAMS Accession No. ML12100A177), NUREG-1431, Volume 1, Revision 4.0, "Standard Technical Specifications, Westinghouse Plants," April 2012 (ADAMS Accession No. ML12100A222), NUREG-1432, Volume 1, Revision 4.0, "Standard Technical Specifications, Combustion Engineering Plants," April 2012 (ADAMS Accession No. ML12102A165), NUREG-1433, Volume 1, Revision 4.0, "Standard Technical Specifications, General Electric BWR [Boiling Water Reactor]/4 Plants," April 2012 (ADAMS Accession No. ML12104A192), and NUREG-1434, Volume 1, Revision 4.0, "Standard Technical Specifications, General Electric BWR/6 Plants," April 2012 (ADAMS Accession No. ML12104A195).

Enclosure

LCO 3.0.9, allowing a delay time for entering a supported system TS, when the inoperability is solely due to an unavailable barrier, if risk is assessed and managed. The postulated initiating events, which may require a functional barrier, are limited to those with low frequencies of occurrence, and the overall TS system safety function would still be available for the majority of anticipated challenges.

This proposal is one of the industry's initiatives being developed under the risk-informed TS program. These initiatives are intended to maintain or improve safety through the incorporation of risk assessment and management techniques in TS, while reducing unnecessary burden and making TS requirements consistent with the Commission's other risk-informed regulatory requirements.

Additionally, LCO 3.0.8 has been revised to replace the term "train" with "division" to be consistent with CGS TS definition of "OPERABLE-OPERABILITY" and the terminology used in Section 1.3, "Completion Times," of CGS TS. LCO 3.0.1 has been revised to include reference to new LCO 3.0.9.

2.0 REGULATORY EVALUATION

In Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36, the Commission established its regulatory requirements related to the content of TS. Pursuant to 10 CFR 50.36, TS are required to include items in the following five specific categories related to station operation: (1) safety limits, limiting safety system settings, and limiting control settings; (2) LCOs; (3) surveillance requirements (SRs); (4) design features; and (5) administrative controls. The rule does not specify the particular requirements to be included in a plant's TS. As stated, in part, in 10 CFR 50.36(c)(2)(i), the "Limiting conditions for operation are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met." CGS TS Section 3.0 for LCO and SR Applicability, provides details or ground rules for complying with the LCOs.

Barriers are doors, walls, floor plugs, curbs, hatches, installed structures or components, or other devices, not explicitly described in TSS that support the performance of the functions of systems described in the TS. For purposes of this TS LCO, the term "barrier" refers to one or more devices which protect one division of a safety system from a given initiating event. A "degraded barrier" refers to a barrier that has been found to be degraded and must be repaired, or to a barrier that is purposefully removed or reconfigured to facilitate maintenance activities. As stated in Nuclear Energy Institute (NEI) 04-08, "Risk-Informed Technical Specifications Initiative 7a, Allowance for Non-Technical Specification Barrier Degradation on Supported System OPERABILITY (TSTF-427), Industry Implementation Guidance," March 2006 (ADAMS Accession No. ML061220426), LCO 3.0.9 specifically does not apply to fire barriers, snubbers, or barriers which support ventilation systems or non-TS systems, or barriers which support TS systems where the unavailability of the barrier does not render the supported system inoperable.

Some TS-required systems may require one or more functional barriers in order to perform their intended function(s) for certain initiating events for which the barriers provide some protective

support function. For example, there are barriers to protect systems from the effects of internal flooding, such as floor plugs and retaining walls, and barriers are used to protect equipment from steam impingement in case of high energy line breaks. Barriers are also used to protect systems against missiles, either internally generated, or generated by external events.

Barriers are not explicitly described in the TS, but are required to be capable of performing their required support function by the definition of OPERABILITY for the supported system, which is described in the TS. Therefore, under the current STS, the supported system must be declared inoperable when the related barrier(s) are unavailable. However, the magnitude of plant risk associated with the barrier, which cannot perform its related support function, is much less than the risk associated with direct unavailability of the supported system, since barriers are only required for specific, low-frequency initiating events.

Some potential undesirable consequences of the current TS requirements include:

1. When maintenance activities on the supported TS system require removal and restoration of barriers, the time available to complete maintenance and perform system restoration and testing is reduced by the time spent maneuvering the barriers within the time constraints of the supported system LCO;
2. Restoration of barriers following maintenance may be given a high priority due to time restraints of the existing supported system LCO, when other activities may have a greater risk impact and should therefore be given priority; and
3. Unnecessary plant shutdowns may occur due to discovery of degraded barriers, which require more time than provided by the existing supported system LCO to complete repairs and restoration of the barrier.

To improve the treatment of unavailable barriers and enhance safety, the TSTF proposed a risk-informed TS change that introduces a delay time before entering the actions for the supported equipment, when one or more barriers are found to be degraded, or are removed or reconfigured to support maintenance activities, if risk is assessed and managed. Such a time delay will provide needed flexibility in the performance of maintenance and at the same time will enhance overall plant safety by:

1. Performing system maintenance and restoration activities, including post-maintenance testing, within the existing TS LCO time, and allowing barrier removal and restoration to be performed outside of the TS LCO, providing more time for the safe conduct of maintenance and testing activities on the supported TS system;
2. Requiring barrier removal and restoration activities to be assessed and prioritized based on actual plant risk impacts; and
3. Avoiding unnecessary unscheduled plant shutdowns and thus minimizing plant transition and realignment risks.

3.0 TECHNICAL EVALUATION

3.1 Proposed TS Changes

Current LCO 3.0.1 states:

LCOs shall be met during the MODES or other specified conditions in the Applicability, except as provided in LCO 3.0.2, LCO 3.0.7, and LCO 3.0.8.

Revised LCO 3.0.1 would state:

LCOs shall be met during the MODES or other specified conditions in the Applicability, except as provided in LCO 3.0.2, LCO 3.0.7, LCO 3.0.8, and LCO 3.0.9.

Current LCO 3.0.8 states:

When one or more required snubbers are unable to perform their associated support function(s), any affected supported LCO(s) are not required to be declared not met solely for this reason if risk is assessed and managed, and:

- a. The snubbers not able to perform their associated support function(s) are associated with only one train or subsystem of a multiple train or subsystem supported system or are associated with a single train or subsystem supported system and are able to perform their associated support function within 72 hours; or
- b. The snubbers not able to perform their associated support function(s) are associated with more than one train or subsystem of a multiple train or subsystem supported system and are able to perform their associated support function within 12 hours.

At the end of the specified period the required snubbers must be able to perform their associated support function(s), or the affected supported system LCO(s) shall be declared not met.

Revised LCO 3.0.8 would state:

When one or more required snubbers are unable to perform their associated support function(s), any affected supported LCO(s) are not required to be declared not met solely for this reason if risk is assessed and managed, and:

- a. The snubbers not able to perform their associated support function(s) are associated with only one division or subsystem of a multiple division or subsystem supported system or are associated with a single division or subsystem supported system and are able to perform their associated support function within 72 hours; or

- b. The snubbers not able to perform their associated support function(s) are associated with more than one division or subsystem of a multiple division or subsystem supported system and are able to perform their associated support function within 12 hours.

At the end of the specified period the required snubbers must be able to perform their associated support function(s), or the affected supported system LCO(s) shall be declared not met.

The proposed change adds a new LCO 3.0.9 to the TS. LCO 3.0.9 allows licensees to delay declaring an LCO not met for equipment supported by barriers unable to perform their associated support function, when risk is assessed and managed. This new CGS TS LCO 3.0.9 would state:

When one or more required barriers are unable to perform their related support function(s), any supported system LCO(s) are not required to be declared not met solely for this reason for up to 30 days provided that at least one division or subsystem of the supported system is OPERABLE and supported by barriers capable of providing their related support function(s), and risk is assessed and managed. This specification may be concurrently applied to more than one division or subsystem of a multiple division or subsystem supported system provided at least one division or subsystem of the supported system is OPERABLE and the barriers supporting each of these divisions or subsystems provide their related support function(s) for different categories of initiating events.

For the purposes of this specification, the High Pressure Core Spray (HPCS) system, the Reactor Core Isolation Cooling (RCIC) system, and the Automatic Depressurization System (ADS) are considered independent subsystems of a single system.

If the required OPERABLE division or subsystem becomes inoperable while this specification is in use, it must be restored to OPERABLE status within 24 hours or the provisions of this specification cannot be applied to the divisions or subsystems supported by the barriers that cannot perform their related support function(s).

At the end of the specified period, the required barriers must be able to perform their related support function(s), or the supported system LCO(s) shall be declared not met.

LCO 3.0.8 has been revised to replace the term "train" with "division" to be consistent with CGS TS definition of "OPERABLE-OPERABILITY" and the terminology used in Section 1.3, "Completion Times," of CGS TS and the new LCO 3.0.9 proposed by TSTF-427 has also been revised accordingly.

3.2 Background

The industry submitted TSTF-427, Revision 2, in support of the proposed TS change. This submittal documents a risk-informed analysis of the proposed TS change. Probabilistic risk assessment (PRA) methods are used, in combination with deterministic and defense-in-depth arguments, to identify and justify delay times for entering the actions for the supported equipment associated with unavailable barriers at nuclear power plants. The industry also submitted implementation guidance NEI 04-08. This submittal provides detailed guidance on assessing and managing risk associated with unavailable barriers. This is in accordance with guidance provided in U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," July 1998 (ADAMS Accession No. ML003740133), and RG 1.177, "An Approach for Plant-Specific Risk-Informed Decisionmaking: Technical Specifications," August 1998 (ADAMS Accession No. ML003740176).

The risk impact associated with the proposed delay times for entering the TS actions for the supported equipment can be assessed using the same approach as for allowed Completion Time (CT) extensions. Therefore, the risk assessment was performed following the three-tiered approach recommended in RG 1.177 for evaluating proposed extensions in currently allowed CTs:

1. 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 (Δ CDF) and the average yearly large early release frequency (Δ LERF), and (2) by the incremental conditional core damage probability (ICCDP) and the incremental conditional large early release probability (ICLERP). The assessed Δ CDF and Δ LERF 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 in RG 1.177, which provide assurance that the plant risk does not increase unacceptably during the period the equipment is taken out of service.
2. 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 taken out of service 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.
3. 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.

A simplified risk assessment was performed to justify the proposed addition of LCO 3.0.9 to CGS's TS. This approach was necessitated by (1) the general nature of the proposed TS change (i.e., it applies to all plants and is associated with an undetermined number of barriers that are not able to perform their function), and (2) the lack of detailed modeling in most plant-specific PRAs which do not include passive structures such as barriers.

The simplified risk assessment considers three different parameters:

1. The length of time the affected barrier is unavailable,
2. The initiating event frequency for which the affected barrier is designed to mitigate, and
3. The importance to CDF (or LERF) of the TS equipment (division, subsystem, or component) for which the affected barrier is designed to protect, measured by the risk achievement worth (RAW) of the equipment.

The ICCDP can be calculated based on the following equation:

$$ICCDP = \left[\frac{T_c}{8766} \times \frac{IE_i}{IE_T} \right] \times \left[(RAW_j \times CDF_{base}) - CDF_{base} \right]$$

Where:

- T_c is the time the barrier is unavailable (hours),
- $T_c/8766$ is therefore the fraction of the year during which the barrier is unavailable,
- IE_i/IE_T is the ratio of the initiating event frequency for which the affected barrier is designed to mitigate, IE_i , and the total initiating event frequency, IE_T ,
- RAW_j is the risk achievement worth of the component(s) for which the barrier provides protection, and
- CDF_{base} is the baseline CDF (per year).

ICLERP also may be similarly determined, using baseline LERF and RAW values with respect to LERF. It is assumed that the magnitude of the LERF risk resulting from the barrier unable to perform its related support function would be generally at least one order of magnitude less than the corresponding CDF risk. Containment bypass scenarios, which are typically the significant contributors to LERF, would not be uniquely affected by application of LCO 3.0.9, and initiating events which would be significant LERF contributors, such as steam generator tube rupture and interfacing systems loss-of-coolant accident (LOCA), are not typically associated with barriers within the scope of LCO 3.0.9. Therefore, the assumption regarding LERF risk is reasonable

and acceptable for the generic risk evaluation, provided that LERF risk impacts are considered on a plant-specific basis for unavailable barriers, as described in Section 3.3.3.

The relevant initiating events (i.e., events for which barriers subject to CGS LCO 3.0.9 provide protection) are:

- internal and external floods,
- high energy line breaks,
- feedwater line breaks,
- LOCA (small, medium, and large),
- tornados and high winds, and
- turbine missiles.

Generic frequencies for most of these initiating events were obtained from NUREG/CR-5750, "Rates of Initiating Events at U.S. Nuclear Power Plants: 1987 – 1995," February 1999 (ADAMS Accession No. ML070580080). For external floods, turbine missiles, and tornados, other industry source documents were referenced. The most limiting (highest frequency) initiating event was obtained for a high energy line break from NUREG/CR-5750, with a frequency of 9.1E-3 per year. The risk assessment is therefore based on this limiting frequency, and the proposed methodology to apply LCO 3.0.9 is similarly restricted to barriers protecting against initiating events whose total frequency is no more than 9.1E-3 per year.

3.3 Risk Assessment Results and Insights

The results and insights from the implementation of the three-tiered approach of RG 1.177 to support the proposed addition of LCO 3.0.9 to CGS TS are summarized and evaluated in the following Sections 3.3.1 to 3.3.3.

3.3.1 Risk Impact

The bounding risk assessment approach, described in Section 3.2, was developed for a range of plant baseline CDF values and for a range of protected component RAW values. The maximum allowable 30-day outage time was used. The results are summarized in Table .

Table . Risk Assessment Results for a Postulated 30-Day Barrier Outage.

Baseline CDF = 1E-6 per year

| RAW | ICCDP | ICLERP |
|-----|---------|---------|
| 2 | 7.5E-10 | 7.5E-11 |
| 10 | 6.7E-09 | 6.7E-10 |
| 50 | 3.7E-08 | 3.7E-09 |
| 100 | 7.4E-08 | 7.4E-09 |

Baseline CDF = 1E-5 per year

| RAW | ICCDP | ICLERP |
|-----|---------|---------|
| 2 | 7.5E-09 | 7.5E-10 |
| 10 | 6.7E-08 | 6.7E-09 |
| 50 | 3.7E-07 | 3.7E-08 |
| 100 | 7.4E-07 | 7.4E-08 |

Baseline CDF = 1E-4 per year

| RAW | ICCDP | ICLERP |
|-----|---------|---------|
| 2 | 7.5E-08 | 7.5E-09 |
| 10 | 6.7E-07 | 6.7E-08 |
| 50 | 3.7E-06 | 3.7E-07 |
| 100 | 7.4E-06 | 7.4E-07 |

The above results represent a sensitivity analysis covering the expected range of plant baseline CDF values and component RAW values. The most limiting configurations involving very high risk components (RAW > 10) would not be anticipated to occur for most planned maintenance activities.

The calculations conservatively assume the most limiting (highest frequency) initiating event and the longest allowable outage time (30 days). Occurrence of the initiating event during unavailability of the barrier is conservatively assumed to directly fail the protected equipment; no credit is taken for event-specific circumstances which may result in the equipment remaining functional even with the barrier unavailable. (For example, a barrier required to protect equipment from steam impingement for high energy line breaks may only be required for breaks occurring in specific locations and orientations relative to the protected equipment, and only for large size breaks.) No credit is taken for avoided risk identified in Section 2.

The risk assessment results of Table 1 were compared to guidance provided in the revised Section 11 of NUMARC 93-01, Revision 2, "Nuclear Energy Institute Industry Guidance for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," April 1996 (ADAMS Accession No. ML101020415), endorsed by RG 1.160, Revision 3, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," May 2012 (ADAMS Accession No. ML12136A011),² for implementing the requirements of paragraph (a)(4) of the Maintenance Rule, 10 CFR 50.65. Such guidance is summarized in Table 2. Guidance regarding the acceptability of conditional risk increase in terms of CDF for a planned configuration is provided.

² The availability of this TS improvement was published in the *Federal Register* on October 3, 2006 (71 FR 58444), as part of the Consolidated Line Item Improvement Process and referenced RG 1.182, "Assessing and Managing Risk Before Maintenance activities at Nuclear Power Plants," May 2000 (ADAMS Accession No. ML003699426). However, RG 1.182 has been superseded by RG 1.160, Revision 3.

This guidance states that a specific configuration that is associated with a CDF higher than 1E-3 per year should not normally be entered voluntarily. The NRC staff notes that the higher risk configurations documented in Table 1 would exceed this guidance and, therefore, would not be permitted to be entered voluntarily. For example, with a baseline CDF of 1E-4 per year, a component with a RAW greater than 10 would exceed the 1E-3 per year criteria. Therefore, the sensitivity analyses presented in Table 1 are understood to include higher risk configurations which would not be permitted under the guidance of NUMARC-93-01.

Table 2. Guidance for Implementing 10 CFR 50.65(a)(4)

| ΔR_{CDF} | | Guidance | |
|------------------------|--|--|--|
| Greater than 1E-3/year | | Configuration should not normally be entered voluntarily | |
| ICCDP | Guidance | ICLERP | |
| Greater than 1E-5 | Configuration should not normally be entered voluntarily | Greater than 1E-6 | |
| 1E-6 to 1E-5 | Assess non-quantifiable factors Establish risk management actions | 1E-7 to 1E-6 | |
| Less than 1E-6 | Normal work controls | Less than 1E-7 | |

Guidance regarding the acceptability of ICCDP and ICLERP values for a specific planned configuration and the establishment of risk management actions is also provided in NUMARC 93-01. This guidance, as shown in Table 2, states that a specific plant configuration that is associated with ICCDP and ICLERP values below 1E-6 and 1E-7, respectively, is considered to require "normal work controls." Table 1 shows that for the majority of barrier outage configurations, the conservatively assessed ICCDP and ICLERP values are within the limits for what is recommended as the threshold for the "normal work controls" region.

As stated in the implementation guidance for STS LCO 3.0.9 (NEI 04-08), plants are required to commit to the guidance of NUMARC 93-01, Section 11 and, therefore, the above limits would be applicable. Plant configurations including out-of-service barriers may, therefore, be entered voluntarily if supported by the results of the risk assessment required by 10 CFR 50.65(a)(4), and by LCO 3.0.9.

RG 1.177 provides guidance of 5E-7 ICCDP and 5E-8 ILERP as the limit for TS allowed outage time. As shown in Table , the guidance is met for the typically anticipated configurations, unless either the baseline CDF for the plant approaches 1E-4 per year or the RAW of the protected components is well above 10. Such configurations may exceed the criteria described in NUMARC 93-01 (Table 2) and would not be voluntarily entered. Such configurations are not expected to be frequently encountered, and may be addressed on a case-by-case plant-specific basis by limiting the allowed outage time and by implementing plant-specific risk management actions, as per the implementing guidance of NEI 04-08.

RG 1.174 provides guidance of 1E-5 per year ΔCDF and 1E-6 per year $\Delta LERF$. The ICCDP calculations demonstrated that each individual 30-day barrier outage is anticipated to be low risk. Although there is no explicit limit on the number of times per year that LCO 3.0.9 may be applied, even assuming barrier outages occurred continuously over the entire year, the risk incurred would still be anticipated to be below the limits of the guidance.

The NRC staff concludes that the risk assessment results support the proposed addition of LCO 3.0.9 to CGS TSs. The risk increases associated with this TS change will be insignificant based on guidance provided in RGs 1.174 and 1.177 and within the range of risks associated with normal maintenance activities.

3.3.2 Identification of 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 taken out of service 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. To avoid these potentially high-risk configurations, specific restrictions to the implementation of the proposed TS changes were identified.

When the proposed LCO 3.0.9 is applied, at least one division or subsystem is required to be operable with required barriers in place, such that this division or subsystem would be available to provide mitigation of the initiating event. The proposed LCO 3.0.9 may be applied to multiple divisions of the same system only for barriers which provide protection for different initiating events, such that at least one division or subsystem is available to provide mitigation of the initiating event. The use of LCO 3.0.9 for barriers, which protect all divisions or subsystems from a particular initiating event, is not permitted. Therefore, potentially high-risk configurations involving a loss of function required for mitigation of a particular initiating event are avoided by the restrictions imposed on applicability of LCO 3.0.9.

LCO 3.0.9 also addresses potential emergent conditions where unplanned failures or discovered conditions may result in the unavailability of a required division or subsystem for a particular initiating event. Such conditions may result during application of LCO 3.0.9 from equipment failure on the operable division, such that all divisions of a TS system are not protected from the same initiating event. In such cases, a 24-hour allowed time is provided to restore the conditions to permit continued operation with unavailable barriers, after which the applicability of LCO 3.0.9 ends, and the supported system LCO becomes effective. This allowed time is provided so that emergent conditions with low risk consequences may be effectively managed, rather than requiring immediate exit of LCO 3.0.9 and the potential for an unplanned plant shutdown.

A limit of 30 days is applied to the LCO 3.0.9 allowed outage time for each barrier, after which the barrier must be restored to an available status, or the supported system TS must be applied. This 30-day backstop applies regardless of the risk level calculated, and provides assurance that installed plant barriers will be maintained available over long periods of time, and that the application of LCO 3.0.9 will not result in long-term degradation of plant barriers.

The NRC staff concludes that the restrictions on the applicability of LCO 3.0.9 assuring that one safety division remains available to mitigate the initiating event, along with the 30-day limit applicable to each barrier, assure that potentially high-risk configurations are avoided in accordance with the guidance provided in RGs 1.174 and 1.177.

3.3.3 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 to comply with the requirements of paragraph (a)(4) of the Maintenance Rule (10 CFR 50.65) to assess and manage risk resulting from maintenance activities, and by LCO 3.0.9 requiring risk assessments and management using (a)(4) processes if no maintenance is in progress. These programs can support licensee decision making regarding the appropriate actions to manage risk whenever a risk-informed TS is entered.

The implementation guidance for LCO 3.0.9 (NEI 04-08) requires that the allowed outage time determination for an unavailable barrier be performed using the plant-specific configuration. Further, the risk determinations are to be updated whenever emergent conditions occur. These requirements assure that the configuration-specific risk associated with unavailable barriers is assessed and managed prior to entry into LCO 3.0.9 and during its applicability as conditions change.

These evaluations for the unavailable barrier are performed as part of the assessment of plant risk required by 10 CFR 50.65(a)(4). The numerical guidance identified in Table 2 is applicable to implementation of LCO 3.0.9, using the results of the configuration-specific risk assessment which addresses the risk impact of the unavailable barrier along with all other out-of-service components and plant alignments.

Risk management actions are required to be considered when the calculated risk exceeds specific thresholds per NUMARC 93-01, Section 11, as identified in Table 2. Additional guidance on risk management actions are provided in the implementation guidance for LCO 3.0.9.

The allowed outage time for a barrier is calculated based on an ICCDP limit of $1E-6$. This is the NUMARC 93-01, Section 11 guidance for applicability of normal work controls, and is conservatively lower than the guidance of $1E-5$ for voluntary maintenance activities. The use of $1E-6$ will result in conservatively short allowed outage times for barriers compared to allowed times for other maintenance activities.

If the scope of the PRA model used to support the plant-specific CRMP does not include the initiating event for which a barrier provides protection, then LCO 3.0.9 applicability is limited to one barrier on a single division. Multiple barriers for such initiating events may not be unavailable under LCO 3.0.9 and, in such situations, the LCO(s) associated with the protected components would be applicable. Applicability of LCO 3.0.9 to the single barrier for an initiating event that is not modeled in the plant PRA is acceptable based on the generic risk analysis provided by TSTF-427, as described in Section 3.3.

Assessment of the LERF risk impact on an unavailable barrier is required to be performed in accordance with NUMARC 93-01, Section 11. If an unavailable barrier provides protection to equipment which is relevant to the containment function, or which protects equipment from the

effects of an initiating event which is a contributor to LERF, then applicability of LCO 3.0.9 must be limited to that one barrier unless a quantified assessment of LERF is performed.

The NRC staff concludes that the risk evaluations necessary to support the applicability of LCO 3.0.9 appropriately consider the risk from unavailable barriers in an integrated manner based on the overall plant configuration. Therefore, potentially high-risk configurations can be identified and managed in accordance with the guidance provided in RGs 1.174 and 1.177.

LCO 3.0.1 has been revised to include reference to new LCO 3.0.9.

3.4 Summary and Conclusions

The unavailability of barriers which protect TS-required components from the effects of specific initiating events is typically a low-risk configuration which should not require that the protected components be immediately declared inoperable. The current TS require that when such barriers are unavailable, the protected component LCO is immediately entered. Some potential undesirable consequences of the current TS requirements include:

1. When maintenance activities on the supported TS system requires removal and restoration of barriers, the time available to complete maintenance and perform system restoration and testing is reduced by the time spent maneuvering the barriers within the time constraints of the supported system LCO;
2. Restoration of barriers following maintenance must be given a high priority due to time restraints of the existing supported system LCO, when other more risk-important activities may have a greater risk impact and should therefore be given priority; and
3. Unnecessary plant shutdowns may occur due to discovery of degraded barriers which may require more than the existing supported system LCO time to complete repairs and restoration.

To remove the overly restrictive requirements in the treatment of barriers, the licensee is proposing a risk-informed TS change which introduces a delay time before entering the actions for the supported equipment when one or more barriers are found degraded or removed to facilitate planned maintenance activities. Such a delay time will provide needed flexibility in the performance of maintenance during power operation and at the same time will enhance overall plant safety by (1) performing system maintenance and restoration activities, including post-maintenance testing, within the existing TS LCO time, and allowing barrier removal and restoration to be performed outside of the TS LCO, providing more time for the safe conduct of maintenance and testing activities on the supported system; (2) requiring barrier removal and restoration activities to be assessed and prioritized based on actual plant risk impacts; and (3) avoiding unnecessary unscheduled plant shutdowns, thus minimizing plant transition and realignment risks.

The risk impact of the proposed TS changes was assessed following the three-tiered approach recommended in RG 1.177. A simplified bounding risk assessment was performed to justify the proposed TS changes. This bounding assessment was selected due to the lack of detailed

plant-specific risk models for most plants which do not include failure modes of passive structures such as barriers. The impact from the addition of the proposed LCO 3.0.9 to the TS on defense-in-depth was also evaluated in conjunction with the risk assessment results.

Based on this integrated evaluation, which is bounding for CGS, the NRC staff concludes that the proposed addition of LCO 3.0.9 to the licensee's TSs would lead to insignificant risk increases as stipulated by RG 1.177 and depicted on Table 1 above. This conclusion is true without taking any credit for the removal of potential undesirable consequences associated with the current conservative treatment of barriers. Therefore, the proposed change provides adequate protection of public health and safety and is acceptable provided the conditions set forth below are satisfied.

The licensee also proposed editorial changes to LCO 3.0.8 to be consistent with their definition of "OPERABLE-OPERABILITY" and the terminology used in Section 1.3, "Completions Times," of the CGS TS. These changes are also consistent with the terminology proposed in LCO 3.0.9. The NRC staff reviewed the proposed changes to LCO 3.0.8 and determined they are acceptable.

Consistent with the NRC staff's approval and inherent in the implementation of TSTF-427, the licensee agreed to implement LCO 3.0.9 by operating in accordance with the following stipulations:

1. The licensee committed to the guidance of NUMARC 93-01, Section 11 and NEI 04-08; and
2. The licensee stated that procedures would be revised to ensure that the guidance on the risk assessment and management process described in NEI 04-08 is used whenever a barrier is considered unavailable and the requirements of LCO 3.0.9 are to be applied. This would be done in accordance with an overall CRMP to ensure that potentially risk-significant configurations resulting from maintenance and other operational activities are identified and avoided.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Washington State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding published in the *Federal Register* on October 27, 2015 (80 FR 65811). Accordingly, the

amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: C. Tilton, NRR/DSS/STSB

Date: February 16, 2016

M. Reddemann

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A copy of the related Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's next biweekly *Federal Register* notice.

Sincerely,

/RA/

Balwant K. Singal, Senior Project Manager
Plant Licensing Branch IV-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosures:

- 1. Amendment No. 237 to NPF-21
- 2. Safety Evaluation

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***Memo dated 2/5/16**

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