



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

February 24, 2021

Vice President, Operations
Entergy Operations, Inc.
Grand Gulf Nuclear Station
P.O. Box 756
Port Gibson, MS 39150

SUBJECT: GRAND GULF NUCLEAR STATION, UNIT 1 – ISSUANCE OF AMENDMENT
NO. 227 RE: EXTENSION OF APPENDIX J INTEGRATED LEAKAGE TEST
INTERVAL (EPID L-2020-LLA-0027)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 227 to Renewed Facility Operating License No. NPF-29 for the Grand Gulf Nuclear Station, Unit 1 (Grand Gulf). The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated February 19, 2020, as supplemented by letter dated June 26, 2020.

The amendment allows a permanent extension from the 10-year frequency of the Grand Gulf containment integrated leakage rate test (ILRT) to 15 years. This test is required by Grand Gulf TS 5.5.12, "10 CFR 50 [Title 10 of the *Code of Federal Regulations* Part 50], Appendix J, Testing Program." The change permits the existing ILRT frequency to be extended from 10 years to 15 years between tests.

The amendment revises TS 5.5.12 to allow the following:

- Increase the existing Type A ILRT program test interval from 10 years to 15 years in accordance with Nuclear Energy Institute (NEI) 94-01, Revision 3--A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," and the conditions and limitations specified in NEI 94-01, Revision 2-A, dated October 2008, as the guidance document for implementation of performance-based "Option B- Performance-Based Requirements" of 10 CFR Part 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors."
- Adopt the use of American National Standards Institute/American Nuclear Society 56.8-2002, "Containment System Leakage Testing Requirements," for Type A leakage rate tests.
- Adopt a more conservative allowable test interval extension of 9 months, for Type A leakage rate tests in accordance with NEI 94-01, Revision 3--A.

This amendment would allow the performance of the next ILRT 15 years from the scheduled spring 2022 end of cycle 23 refueling outage.

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

Sincerely,

/RA/

Siva P. Lingam, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosures:

1. Amendment No. 227 to NPF-29
2. Safety Evaluation

cc: Listserv



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

ENERGY OPERATIONS, INC.

SYSTEM ENERGY RESOURCES, INC.

COOPERATIVE ENERGY, A MISSISSIPPI ELECTRIC COOPERATIVE

ENERGY MISSISSIPPI, LLC

DOCKET NO. 50-416

GRAND GULF NUCLEAR STATION, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 227
Renewed License No. NPF-29

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Entergy Operations, Inc. (the licensee), dated February 19, 2020, as supplemented by letter dated June 26, 2020, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and 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-29 is hereby amended to read as follows:

- (2) Technical Specifications

- The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 227 are hereby incorporated into this renewed license. Entergy Operations, Inc. shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 90 days from the date of this amendment.

FOR THE NUCLEAR REGULATORY COMMISSION

Jennifer L. Dixon-Herrity, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed Facility
Operating License No. NPF-29 and
the Technical Specifications

Date of Issuance: February 24, 2021

ATTACHMENT TO LICENSE AMENDMENT NO. 227

RENEWED FACILITY OPERATING LICENSE NO. NPF-29

GRAND GULF NUCLEAR STATION, UNIT 1

DOCKET NO. 50-416

Replace the following pages of Renewed Facility Operating License No. NPF-29 and the Appendix A, Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Renewed Facility Operating License

Remove

4

Insert

4

Technical Specifications

Remove

3.6-2

3.6-7

5.0-16

5.0-16a

5.0-16b

Insert

3.6-2

3.6-7

5.0-16

5.0-16a

5.0-16b

amended, are fully applicable to the lessors and any successors in interest to those lessors, as long as the renewed license of GGNS Unit 1 remains in effect.

- (b) SERI is required to notify the NRC in writing prior to any change in (i) the terms or conditions of any new or existing sale or lease agreements executed as part of the above authorized financial transactions, (ii) the GGNS Unit 1 operating agreement, (iii) the existing property insurance coverage for GGNS Unit 1 that would materially alter the representations and conditions set forth in the Staff's Safety Evaluation Report dated December 19, 1988 attached to Amendment No. 54. In addition, SERI is required to notify the NRC of any action by a lessor or other successor in interest to SERI that may have an effect on the operation of the facility.

- C. The renewed license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

- (1) Maximum Power Level

Entergy Operations, Inc. is authorized to operate the facility at reactor core power levels not in excess of 4408 megawatts thermal (100 percent power) in accordance with the conditions specified herein.

- (2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 227 are hereby incorporated into this renewed license. Entergy Operations, Inc. shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

During Cycle 19, GGNS will conduct monitoring of the Oscillation Power Range Monitor (OPRM). During this time, the OPRM Upscale function (Function 2.f of Technical Specification Table 3.3.1.1-1) will be disabled and operated in an "indicate only" mode and technical specification requirements will not apply to this function. During such time, Backup Stability Protection measures will be implemented via GGNS procedures to provide an alternate method to detect and suppress reactor core thermal hydraulic instability oscillations. Once monitoring has been successfully completed, the OPRM Upscale function will be enabled and technical specification requirements will be applied to the function; no further operating with this function in an "indicate only" mode will be conducted.

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.1.1.1	Perform required visual examinations and leakage rate testing except for primary containment air lock testing, in accordance with 10 CFR 50, Appendix J, as modified by approved exemptions.	In accordance with 10 CFR 50, Appendix J, Testing Program

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.6.1.2.1</p> <p>-----NOTES-----</p> <p>1. An inoperable air lock door does not invalidate the previous successful performance of the overall air lock leakage test.</p> <p>-----</p> <p>Perform required primary containment air lock leakage rate testing in accordance with 10 CFR 50, Appendix J, as modified by approved exemptions.</p> <p>The acceptance criteria for air lock testing are:</p> <p>a. Overall air lock leakage rate is $\leq 0.05 L_a$ when tested at $\geq P_a$.</p> <p>b. For each door, leakage rate is $\leq 0.01 L_a$ when the gap between the door seals is pressurized to $\geq P_a$.</p>	<p>In accordance with 10 CFR 50, Appendix J, Testing Program</p>
<p>SR 3.6.1.2.2</p> <p>Verify primary containment air lock seal air flask pressure is ≥ 90 psig.</p>	<p>In accordance with the Surveillance Frequency Control Program</p>

(continued)

5.5 Programs and Manuals (continued)

5.5.11 Technical Specifications (TS) Bases Control Program

This program provides a means for processing changes to the Bases of these Technical Specifications.

- a. Changes to the Bases of the TS shall be made under appropriate administrative controls and reviews.
- b. Licensees may make changes to Bases without prior NRC approval provided the changes do not require either of the following:
 1. A change in the TS incorporated in the license; or
 2. A change to the updated FSAR or Bases that requires NRC approval pursuant to 10 CFR 50.59.
- c. The Bases Control Program shall contain provisions to ensure that the Bases are maintained consistent with the UFSAR.
- d. Proposed changes that do not meet the criteria of either Specification 5.5.11.b.1 or Specification 5.5.11.b.2 above shall be reviewed and approved by the NRC prior to implementation. Changes to the Bases implemented without prior NRC approval shall be provided to the NRC on a frequency consistent with 10 CFR 50.71(e).

5.5.12 10 CFR 50, Appendix J, Testing Program

A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions except that the next Type A test performed after the October 19, 2008 Type A test shall be performed no later than the plant restart after the End of Cycle 23 Refueling Outage. This program shall be in accordance with the guidelines contained in NEI 94-01, Revision 3-A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," dated July 2012, and the conditions and limitations specified in NEI 94-01, Revision 2-A, Section 4.1, dated October 2008.

The calculated peak containment internal pressure for the design basis loss of coolant accident, P_a , is 12.1 psig.

The maximum allowable primary containment leakage rate, L_a , at P_a , shall be 0.682% of primary containment air weight per day.

(continued)

5.5 Programs and Manuals (continued)

5.5.12 10 CFR 50, Appendix J, Testing Program (continued)

The Primary Containment leakage rate acceptance criterion is $\leq 1.0 L_a$. During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are $\leq 0.60 L_a$ for the Type B and Type C tests and $\leq 0.75 L_a$ for Type A tests.

The provisions of SR 3.0.2 do not apply to test frequencies specified in the Primary Containment Leakage Rate Testing Program.

The provisions of SR 3.0.3 are applicable to the Primary Containment Leakage Rate Testing Program.

5.5.13 Control Room Envelope Habitability Program

A Control Room Envelope (CRE) Habitability Program shall be established and implemented to ensure that CRE habitability is maintained such that, with an OPERABLE Control Room Fresh Air (CRFA) System, CRE occupants can control the reactor safely under normal conditions and maintain it in a safe condition following a radiological event, hazardous chemical release, or a smoke challenge. The program shall ensure that adequate radiation protection is provided to permit access and occupancy of the CRE under Design Basis Accident (DBA) conditions without personnel receiving radiation exposures in excess of 5 rem total effective dose equivalent for the duration of the accident. The program shall include the following elements:

- a. The definition of the CRE and the CRE boundary.
- b. Requirements for maintaining the CRE boundary in its design condition including configuration control and preventive maintenance.
- c. Requirements for (i) determining the unfiltered air inleakage past the CRE boundary into the CRE in accordance with the testing methods and at the Frequencies specified in Sections C.1 and C.2 of Regulatory Guide 1.197, "Demonstrating Control Room Envelope Integrity at Nuclear Power Reactors," Revision 0, May 2003 and (ii) assessing CRE habitability at the Frequencies specified in Sections C.1 and C.2 of Regulatory Guide 1.197, Revision 0.
- d. Since the CRE is at a neutral pressure during isolation mode, the CRE will be maintained, including the following:

(continued)

5.5 Programs and Manuals

5.5.13 Control Room Envelope Habitability Program (continued)

1. Plant maintenance activities such as modifications, rework, and preventive maintenance tasks on components that could affect the CRE shall be controlled under fleet, plant and system specific procedures to ensure that the CRE boundary is not degraded by such activities.
 2. Testing of CRFA system sealing areas shall be performed following maintenance activities (rework and preventative) and periodically to ensure that the areas of negative pressures do not leak bypassing emergency filtration system components.
 3. Fire damper inspection procedures that require opening of duct panels and doors shall ensure that upon restoration no leakage path exists.
 4. The remainder of ducting components such as plenum access doors, duct access doors (rectangular and round), flex connections (ventglass, etc), plugs, and patches will be maintained per paragraph b.
 5. An assessment of the CRE Boundary will be conducted at a frequency in accordance with the Surveillance Frequency Control Program. The results of assessing items 1 through 4 shall be trended and used as part of the assessment of the CRE boundary as indicated in paragraph c.
- e. The quantitative limits on unfiltered air leakage into the CRE. These limits shall be stated in a manner to allow direct comparison to the unfiltered air leakage measured by testing described in paragraph c. The unfiltered air leakage limit for radiological challenges is the leakage flow rate assumed in the licensing basis analyses of OBA consequences. Unfiltered air leakage limits for hazardous chemicals must ensure that exposure of CRE occupants to these hazards will be within the assumptions in the licensing basis.
 - f. The provisions of SR 3.0.2 are applicable to the Frequencies for assessing CRE habitability, determining CRE unfiltered leakage, and assessing the CRE boundary as required by paragraphs c and d, respectively.
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 227 TO

RENEWED FACILITY OPERATING LICENSE NO. NPF-29

ENTERGY OPERATIONS, INC., ET AL.

GRAND GULF NUCLEAR STATION, UNIT 1

DOCKET NO. 50-416

1.0 INTRODUCTION

By application dated February 19, 2020 (Reference 1), as supplemented by letter dated June 26, 2020 (Reference 2), Entergy Operations, Inc. (Entergy, the licensee) submitted a license amendment request (LAR) for Grand Gulf Nuclear Station, Unit 1 (Grand Gulf, GGNS). The supplemental letter superseded the Technical Specification (TS) changes of the original LAR in its entirety due to the licensee's Exigent LAR submitted on March 31, 2020 (Reference 3) that was approved on April 15, 2020 as Amendment No. 224 (Reference 4). The Exigent amendment approval resulted in no change to Surveillance Requirement (SR) 3.6.5.1.1 as noted in the supplemental letter.

The LAR dated February 19, 2020 (hereafter called as LAR), would revise TS 5.5.12, "10 CFR 50 [Title 10 of the *Code of Federal Regulations*, Part 50], Appendix J, Testing Program," to adopt Nuclear Energy Institute (NEI) 94-01, Revision 3-A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," (Reference 5), and the limitations and conditions specified in NEI 94-01, Revision 2-A, dated October 2008 (Reference 6), as the guidance document for implementation of performance-based Option B of 10 CFR Part 50, Appendix J. This change would allow the maximum interval for the Integrated Leakage Rate Test (ILRT) to extend from once in 10 years to once in 15 years.

The LAR also proposed to align the content and format of TS 5.5.12 with that of NUREG-1434, "Standard Technical Specifications [STS], General Electric BWR [Boiling Water Reactors]/6 Plants," Volume 1, "Specifications," STS TS 5.5.13, "Primary Containment Leakage Rate Testing Program" (Reference 7), which necessitates the amendment of the following Grand Gulf TSs:

- TS 3.6.1.1, "Primary Containment," SR 3.6.1.1.1, which deletes the acceptance criteria because it would be redundant with the proposed change to TS 5.5.12.

- TS 3.6.1.2, “Primary Containment Air Locks,” SR 3.6.1.2.1, which removes the reference to the acceptance criteria listed in SR 3.6.1.1.1 because it would now be presented in the proposed change to TS 5.5.12.
- TS 5.5.12 to reformat it to conform to the content and format of STS 5.5.13, applicable to Grand Gulf.

The supplemental letter dated June 26, 2020, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the U.S. Nuclear Regulatory Commission (NRC, the Commission) staff’s original proposed no significant hazards consideration determination as published in the *Federal Register* on April 7, 2020 (85 FR 19510).

2.0 REGULATORY EVALUATION

2.1 Description of Containment System

Grand Gulf’s reactor is a General Electric BWR enclosed by a Mark III type pressure suppression containment system consisting of a vapor suppression pool, and a primary containment structure designed to divert the energy released during a design-basis large-break loss-of-coolant accident (LOCA). The drywell communicates with the primary containment through a series of horizontal vents in the drywell wall. The vents are covered both inside and outside the drywell by water from the annular-shaped suppression pool, which forms a seal between the drywell and the primary containment. The drywell contains the reactor coolant system and other high energy piping systems. The Grand Gulf containment is discussed in Section 6.2, “Containment Systems,” of the Grand Gulf Updated Final Safety Analysis Report (Reference 8).

Several tests are performed to ensure the integrity of the containment/drywell function, including the ILRT. The primary containment provides a “leaktight” barrier against the potential uncontrolled release of fission products during a LOCA. Grand Gulf TS 5.5.12 identifies the primary containment leak rate testing requirements and an overall acceptance criterion for the Type A, Type B, and Type C tests. The leakage acceptance criteria for Type A, Type B, and Type C tests are provided in SR 3.6.1.1.1 in TS 3.6.1.1.

2.2 Limitations and Scope

The inspections associated with the 10 CFR Part 50, Appendix J testing program are limited to the primary containment structure and its appurtenances. Inspections of the drywell are outside the scope of this program.

The primary purpose of the LAR is to extend the allowed maximum interval for the ILRT, Type A, from once in 10 years to once in 15 years. There are no changes proposed to Type B and Type C tests.

2.3 Background

Grand Gulf adopted 10 CFR Part 50, Appendix J, Option B for Type A (ILRT), and Type B and Type C local leak rate tests (LLRT) by Amendment No. 135 issued by the NRC. This amendment for Grand Gulf allowed for:

- Type A test frequency of at least one test in 10 years based upon two consecutive successful tests.
- Extension of Type B tests to a maximum interval of 10 years based upon completion of two consecutive successful tests.
- Extension of Type C tests up to 5 years based on two consecutive successful tests.

The last ILRT at Grand Gulf, prior to Amendment No. 135, was performed in November 1993. Based on Amendment No. 135, the next ILRT would have been required by November 2003. However, the NRC also issued Amendment No. 164 on January 28, 2004 (Reference 9), allowing a one-time extension of the Type A ILRT interval from 10 to 15 years. Consequently, the next ILRT after the November 1993 test was performed in October 2008. After the expiration of the one-time extension, Grand Gulf reverted to 10-year ILRT intervals, with the next ILRT due in 2018. On December 29, 2017, the NRC staff approved Amendment No. 214 (Reference 10), allowing a one-time extension of the Type A ILRT test interval from 10 to 11.5 years. This extension allowed the performance of the next ILRT from the scheduled spring 2018 end of cycle (EOC) 21 refueling outage (RFO) to the spring 2020 EOC 22 RFO. On April 15, 2020, the NRC staff approved Amendment No. 224, allowing an additional one-time extension of the Type A ILRT test interval. This extension allowed the performance of the next Type A ILRT from the spring 2020 EOC 22 RFO to spring 2022 EOC 23 RFO, which resulted in an increasing interval between the last test in October 2008 and the next test in spring of 2022 to 13.5 years.

By letter dated February 17, 2016, the NRC approved Amendment No. 209 for Grand Gulf (Reference 11) revising the Grand Gulf TS to allow for a permanent extension of the Type C leakage rate testing frequency from up to 60 months to up to 75 months. TS 5.5.12 was revised to delete Type B and C tests from its applicability but retained the applicability of Type A tests. Therefore, the current Grand Gulf TS contains a provision to extend the 10-year Type A test interval by an additional 15 months.

After the February 19, 2020, LAR was submitted, the licensee submitted an exigent LAR on March 31, 2020 (Reference 3), and the NRC staff approved this exigent LAR on April 15, 2020 (Amendment No. 224), allowing a one-time extension of the Type A ILRT interval from 11.5 years to 13.5 years for Grand Gulf due to COVID-19 concerns (Reference 4). The Grand Gulf risk evaluation approved in the exigent LAR is similar to the risk evaluation provided in this LAR and is being re-evaluated in this safety evaluation (SE) considering the permanent Type A interval extension from 10 years to 15 years.

2.4 Licensee's Proposed Changes

2.4.1 TS 5.5.12

The licensee proposed the following changes to Grand Gulf TS 5.5.12:

- Replace the reference to “the Safety Evaluation issued by the Office of Nuclear Reactor Regulation dated April 26, 1995 (GNRI-95/00087) as modified by the Safety Evaluation issued for Amendment No. 135 to the Operating License,” with a reference to NEI 94-01, Revision 3-A, and the conditions and limitations specified in NEI 94-01, Revision 2-A, Section 4.1, for Type A testing.
- Delete the following text to ensure the Grand Gulf Containment Leakage Rate Testing Program is conducted in accordance with NEI 94-01, Revision 3-A for Types A, B, and C testing, and the Revision 2-A conditions and limitations for Type A testing: “Consistent with standard scheduling practices for Technical Specifications required surveillances, intervals for the recommended surveillance frequency for Type A testing may be extended by up to 25 percent of the test interval, not to exceed 15 months.”

In addition, the licensee proposed the following changes to align Grand Gulf TS 5.5.12 with STS 5.5.13 to the extent that the acceptance criteria for containment leak rate testing is provided in TS 5.5.12:

- The leakage rate acceptance criteria for Type A, Type B, and Type C tests currently stated in SR 3.6.1.1.1 would be deleted and added in its entirety to TS 5.5.12.
- The maximum allowable primary containment leakage rate, L_a (leakage of containment air weight) at peak containment pressure (P_a), contained in Grand Gulf TS 1.1, “Definitions,” would be added to TS 5.5.12.
- A reference to SR 3.0.2 and SR 3.0.3 defined in TS 3.0, “Surveillance Requirement (SR) Applicability,” would be added to TS 5.5.12.

As a result of the above described changes, the proposed Grand Gulf TS 5.5.12 would replace the program description in the existing Grand Gulf TS 5.5.12 with:

A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions except that the next Type A test performed after the October 19, 2008 Type A test shall be performed no later than the plant restart after the End of Cycle 23 Refueling Outage. This program shall be in accordance with the guidelines contained in NEI 94-01, Revision 3--A, “Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J,” dated July 2012, and the conditions and limitations specified in NEI 94-01, Revision 2-A, Section 4.1, dated October 2008.

The calculated peak containment internal pressure for the design basis loss of coolant accident, peak containment pressure (P_a), is 12.1 psig.

The maximum allowable primary containment leakage rate, L_a , at P_a , shall be 0.682% of primary containment air weight per day.

The Primary Containment leakage rate acceptance criterion is $\leq 1.0 L_a$. During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are $\leq 0.60 L_a$ for the Type B and Type C tests and $\leq 0.75 L_a$ for Type A tests.

The provisions of SR 3.0.2 do not apply to test frequencies specified in the Primary Containment Leakage Rate Testing Program.

The provisions of SR 3.0.3 are applicable to the Primary Containment Leakage Rate Testing Program.

2.5 Regulatory Requirements

The regulations in 10 CFR 50.36, "Technical specifications" state that the TSs include items in five specific categories. These categories include: (1) safety limits, limiting safety system settings, and limiting control settings; (2) limiting condition for operations (LCOs); (3) SRs; (4) design features; and (5) administrative controls.

Section 50.36(c)(3) of 10 CFR states, "Surveillance requirements are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met." Additionally, Section 50.36(c)(5) of 10 CFR states, "Administrative controls are the provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure operation of the facility in a safe manner."

The regulations in 10 CFR 50.54(o) of 10 CFR require that primary reactor containments for water cooled power reactors be subject to the requirements set forth in Appendix J to 10 CFR Part 50.

The regulations in 10 CFR 50.55a "Codes and standards," contain containment in-service inspection program requirements, which, in conjunction with the requirements of 10 CFR Part 50, Appendix J, ensure continued leaktight and structural integrity of the containment during its service life.

The regulations in 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," paragraph (a)(1), state, in part, that the licensee

. . . shall monitor the performance or condition of structures, systems, or components, against licensee-established goals, in a manner sufficient to provide reasonable assurance that these structures, systems, and components, as defined in paragraph (b) of this section, are capable of fulfilling their intended functions. These goals shall be established commensurate with safety and, where practical, take into account industry-wide operating experience.

The licensee requested a change to the renewed facility operating license for Grand Gulf, in accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit."

Appendix J to 10 CFR Part 50, includes two options: “Option A – “Prescriptive Requirements,” and “Option B – Performance-Based Requirements,” either of which may be chosen by a licensee for meeting the requirements of the Appendix. In TS 5.5.12, Grand Gulf chose to carry out this requirement by implementing Option B with some modifications. Under the performance-based option of 10 CFR Part 50, Appendix J, the test frequency is based upon an evaluation that reviewed the as-found leakage history to determine the frequency for leakage testing, which provides assurance that leakage limits will be maintained.

The testing requirements in 10 CFR Part 50, Appendix J ensure that (a) leakage through containments or systems and components penetrating containments does not exceed allowable leakage rates specified in the TS; and (b) integrity of the containment structure is maintained during the service life of the containment.

Option B of Appendix J to 10 CFR Part 50, specifies performance-based requirements and criteria for preoperational and subsequent leakage rate testing. These requirements are met by performing Type A tests to measure the containment system overall integrated leakage rate; Type B pneumatic tests to detect and measure local leakage rates across pressure-retaining leakage-limiting boundaries such as penetrations; and Type C pneumatic tests to measure containment isolation valve leakage rates. After the preoperational tests, these tests are required to be conducted at periodic intervals based on the historical performance of the overall containment system (for Type A tests), and based on the safety significance and historical performance of each penetration boundary and isolation valve (for Type B and C tests) to ensure integrity of the overall containment system as a barrier to fission product release.

Section V.B.3 of 10 CFR Part 50, Appendix J, Option B, requires that the regulatory guide (RG) or other implementation document used by a licensee to develop a performance-based leakage testing program is included in the plant TSs by general reference. Furthermore, the submittal for TS revisions must contain justification, including supporting analyses, if the licensee chooses to deviate from methods approved by the Commission and endorsed in a RG.

2.6 Regulatory Guidance

NUREG-1434, “Standard Technical Specifications – General Electric Plants BWR/6 Plants,” Revision 4.0, incorporated the Standard Technical Specification Task Force (TSTF) Traveler TSTF-52, Revision 3 (Reference 12) that provided guidance for specific changes to TSs for implementation of 10 CFR Part 50, Appendix J, Option B.

NEI 94-01, Revision 2-A, which incorporates the regulatory positions stated in RG 1.163, “Performance-Based Containment Leak-Test Program,” dated September 1995 (Reference 13) includes provisions for extending Type A test intervals up to 15 years. The NRC final Safety Evaluation Report (SER) for NEI 94-01, Revision 2, “Industry Guideline For Implementing Performance-Based Option of 10 CFR Part 50, Appendix J,” and Electric Power Research Institute (EPRI) Technical Report (TR) No. 1009325, Revision 2, August 2007, “Risk Impact Assessment of Extended Integrated Leak Rate Testing Intervals,” dated June 25, 2008 (References 14 and 15, respectively), states that NEI 94-01, Revision 2 describes an acceptable approach for implementing the optional performance-based requirements of 10 CFR Part 50, Appendix J, Option B. The NRC staff concluded that NEI 94-01, Revision 2, is acceptable for referencing by licensees proposing to amend their containment leakage rate testing TSs, subject to the specific limitations and conditions listed in Section 4.1 of the SER. The SER was incorporated into Revision 2 and subsequently issued as NEI 94-01, Revision 2-A.

NEI 94-01, Revision 3--A, provides guidance for extending Type C LLRT intervals beyond 60 months. The NRC published an SER with limitations and conditions for NEI 94-01, Revision 3, by letter dated June 8, 2012 (Reference 16). In the SER, the NRC concluded that NEI 94-01, Revision 3, describes an acceptable approach for implementing the optional performance-based requirements of 10 CFR Part 50, Appendix J, and is acceptable for reference by licensees proposing to amend their containment leakage rate testing TSs, subject to two conditions. The SER was incorporated into Revision 3 and subsequently issued as NEI 94-01, Revision 3-A, on July 31, 2012.

RG 1.174, Revision 3, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," dated January 2018 (Reference 17) and RG 1.177, Revision 1, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," dated May 2011 (Reference 18) provide the guidelines for risk assessment to support the proposed change.

RG 1.200, Revision 2, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," dated March 2009 (Reference 19), describes one acceptable approach for determining whether the technical adequacy of the probabilistic risk assessment (PRA), in total or the parts that are used to support an application, is sufficient to provide confidence in the results, such that the PRA can be used in regulatory decisionmaking for light-water reactors.

3.0 TECHNICAL EVALUATION

3.1 Integrated Leak Rate Testing History

With the licensee's proposed change, Grand Gulf will implement NEI 94-01, Revision 3-A, and the limitations and conditions of Section 4.1 of the NEI 94-01, Revision 2-A, SER. NEI 94-01, Revision 3-A, provides the extension of the Type A test interval to 15 years based on two consecutive successful Type A tests (performance history) and other requirements as stated in Section 9.2.3, "Extended Test Intervals." The basis for acceptability of extending the Type A test interval also includes implementation of robust Type B and Type C testing of the penetration barriers where most containment leakage has historically been shown to occur and are expected to continue to be the pathways for a majority of potential primary containment leakage; and of a robust containment visual inspection program where deterioration of the primary containment boundary away from penetrations can be detected and remediated before any significant leakage potential were to develop.

The licensee justified the proposed TS changes by providing historical plant-specific containment leakage testing program results and containment inservice inspection program results and a supporting plant-specific risk assessment, consistent with the guidance in NEI 94-01, Revision 2-A. The NRC staff reviewed the LAR, as supplemented, and provided the deterministic evaluation in the following sections of this SE regarding the acceptability of the requested changes in providing assurance that containment leaktight integrity will continue to be maintained.

3.1.1 Historical Type A Test (ILRT) Results

In Table 3.3.4-1, "Integrated Leakage Rate Testing (ILRT) History," of the enclosure to the LAR, the licensee provided the historical results of ILRT. In Table 3.3.5-1, "Verification of Current Extended ILRT Interval for GGNS," of the enclosure to the LAR, the licensee provided

verification of the current extended ILRT interval. The results show that 95 percent upper confidence limit leakage rate measured in 1993 was -0.155 weight percent per day. Table 3.3.5-1 of the enclosure to the LAR provides reconciliation of the negative leakage rate showing that after making corrections for pressure and volume, Types B and C penalties, and components isolated during ILRT, the performance leakage rate calculated was 0.210 weight percent per day, which is below the acceptance criteria in 1993 of 0.328 weight percent per day.

The NEI 94-01, Revision 3-A (and Revision 2-A) guidance for allowing the extended ILRT interval is that the past two consecutive tests meet the performance criterion by showing a leakage of L_a or less. Grand Gulf TS 1.1 defines L_a as "The maximum allowable primary containment leakage rate, L_a , shall be 0.682% of primary containment air weight per day at the calculated peak containment pressure (P_a).” The Grand Gulf TS 5.5.12 performance criterion is L_a (0.682 percent of primary containment air weight per day at the calculated P_a) and the acceptance criterion for reactor restart is $0.75 L_a$ (0.5115 weight percent per day). The 1993 and 2008 ILRT results both show leakage less than L_a , and thus, meet the NEI 94-01 guidance for interval extension.

The past two ILRT results (1993 and 2008) for Grand Gulf dating back to 1993 have confirmed that the primary containment leakage rates are acceptable with respect to the design criterion L_a per day. Since the last two Type A tests for Grand Gulf had "as-found" test results well within the maximum allowable containment leakage rate in TS 5.5.12 applicable at the time of the tests, a permanent test frequency of 15 years in accordance with NEI 94-01, Revision 3-A, and the limitations and conditions of NEI 94-01, Revision 2-A, would be acceptable.

3.1.2 Historical Type B and Type C Combined Test (LLRT) Results

In Table 3.5.1-1, "Types B and C LLRT Combined As-Found/As-Left Trend Summary," of the enclosure to the LAR, the licensee presented the historical results of the Grand Gulf Types B and C tests combined leakage totals for as-found minimum pathway, as-left maximum pathway, and as-left minimum pathway.

The Grand Gulf SR 3.6.1.1.1 criterion for combined Types B and C tests total is $0.6 L_a$. As detailed in NEI 94-01, this criterion is the evaluated minimum pathway for as-found values and the maximum pathway for as-left values. The as-found minimum pathway total provides an assessment of the leakage testing and corrective action programs effectiveness for ensuring penetration leakage potential is kept acceptable throughout each operating cycle such that margin to L_a is maintained to accommodate some increase in non-penetration leakage potential between ILRTs. The as-left maximum pathway total criterion is a permissive for restoring primary containment operability and ensures margin is available to accommodate increases in leakage potential between outages where leakage testing is performed.

The last five combined Types B and C testing totals show substantial margin to the applicable performance criterion, suggesting that both the ILRT and LLRT performance criteria are unlikely to be exceeded by allowing Grand Gulf ILRT maximum interval to be extended to 15 years.

3.1.3 Evaluation of TS Changes

The NRC staff's review of the changes to Grand Gulf TS 5.5.12 and SRs is as follows:

The reference to "the Safety Evaluation issued by the Office of Nuclear Reactor Regulation dated April 26, 1995 (GNRI-95/00087) as modified by the Safety Evaluation issued for Amendment No. 135 to the Operating License," in TS 5.5.12 will be replaced by a reference to NEI 94 01, Revision 3-A, and the limitations and conditions specified in NEI 94 01, Revision 2 A, Section 4.1, for Type A testing. The NRC staff concluded that NEI 94 01, Revision 2 A, is acceptable for referencing by licensees proposing to amend their containment leakage rate testing TSs, subject to the specific limitations and conditions listed in Section 4.1 of the SER. NEI 94 01, Revision 2 A, incorporates the regulatory positions stated in RG 1.163 and includes provisions for extending Type A test intervals up to 15 years. As stated earlier, in lieu of RG 1.163, the Grand Gulf TS refers to the SE issued with Amendment No. 135. Therefore, the revised statement to replace the SE issued with Amendment No. 135 with a reference to NEI 94 01, Revision 3-A, and the limitations and conditions specified in NEI 94 01, Revision 2 A, Section 4.1, for Type A testing is an equivalent statement, and therefore is acceptable.

The retention of the statement, "except that the next Type A test performed after the October 19, 2008 Type A test shall be performed no later than the plant restart after the End of Cycle 23 Refueling Outage," as described in the supplement to the LAR, ensures that the next 10 year Type A test, after the two extensions approved by the NRC, will first be performed in EOC 23 RFO, before the ILRT extension to 15 years would become effective. Therefore, the NRC staff finds this change acceptable.

The licensee proposed to delete the statement "Consistent with standard scheduling practices for Technical Specifications required surveillances, intervals for the recommended surveillance frequency for Type A testing may be extended by up to 25 percent of the test interval, not to exceed 15 months," consistent with the limitations and conditions in NEI 94-01, Revision 2-A. Condition 5 in NEI 94-01, Revision 2-A, states, in part, that, "If a licensee has to utilize the provision of Section 9.1 of NEI 94-01, Revision 2-A, related to extending the ILRT interval beyond 15 years, the licensee must demonstrate to the NRC staff that it is an unforeseen emergent condition." The licensee's response to Condition 5 states that Grand Gulf will follow the requirements of NEI 94-01, Revision 3-A, Section 9.1, which have remained unchanged from Revision 2-A to Revision 3-A of NEI 94-01. The licensee further states that, "In accordance with the requirements of NEI 94-01, Revision 2-A, [SER] Section 3.1.1.2, GGNS will also demonstrate to the NRC staff that an unforeseen emergent condition exists in the event an extension beyond the 15-year interval is required." Accordingly, the NRC staff finds this change is acceptable.

The NRC staff compared the definition of L_a in TS 1.1 with the proposed language in TS 5.5.12 and concluded that barring minor differences in language, the meaning of L_a is essentially the same. In addition, the proposed terminology in TS 5.5.12 is consistent with the definition in STS 5.5.13 in NUREG-1434.

The acceptance criteria contained in Grand Gulf SR 3.6.1.1.1 is slightly reworded in Grand Gulf TS 5.5.12 but with no impact on the acceptance values.

As stated in Section 2.3 of this SE, prior to the issuance of Amendment No. 209, Grand Gulf TS 5.5.12 contained a statement allowing extension of surveillance frequencies for Type A, B, and C testing up to 25 percent of the test interval, not to exceed 15 months. By Amendment

No. 209, the statement was revised to delete Type B and C tests from its applicability but retained the applicability of Type A tests. Therefore, the current Grand Gulf TS contains a provision to extend the 10-year Type A test interval by an additional 15 months. Further, in response to NRC Condition 5 of NEI 94-01, Revision 2-A (see Section 3.2.3 of this SE), the licensee agreed not to utilize any provisions to extend the ILRT (Type A) interval beyond 15 years, other than demonstrating to the NRC staff that an unforeseen emergent condition exists.

The NRC staff finds that the provisions of SR 3.0.2 do not apply to test frequencies specified in the Primary Containment Leakage Rate Testing Program, consistent with the guidance of the 10 CFR Part 50, Appendix J testing program. Therefore, the proposed change is acceptable.

The proposed statement regarding the applicability of Grand Gulf SR 3.0.3 is similar to a statement contained in STS 5.5.13 under Option B. In addition, the requirements in SR 3.0.3 of Grand Gulf TSs are exactly like the requirements in SR 3.0.3 of the STS 3.0.3. Therefore, the NRC staff finds that the proposed change is acceptable.

The NRC staff reviewed the proposed relocation of the acceptance criteria from SR 3.6.1.1.1 to TS 5.5.12 and concludes that TS 5.5.12 will contain the same acceptance values as in SR 3.6.1.1.1. The slightly reworded format of the acceptance criteria in TS 5.5.12 maintains consistency with the description of the acceptance criteria in STS 5.5.13.

SR 3.6.1.2.1 currently refers to the acceptance criteria listed in SR 3.6.1.1.1, which states in Note 2 that, "Results shall be evaluated against the acceptance criteria of SR 3.6.1.1.1 in accordance with 10 CFR 50, Appendix J, as modified by approved exemptions." The licensee proposed to delete Note 2 in SR 3.6.1.2.1.

The NRC staff finds the proposed changes to SR 3.6.1.1.1 and SR 3.6.1.2.1 acceptable because the acceptance criteria for primary containment leak rate testing remains unchanged and continues to be available in TS 5.5.12. The proposed change is consistent with STS 5.5.13 of NUREG-1434. Therefore, the NRC staff concludes that Grand Gulf TS's compliance with 10 CFR 50.36(c)(3) is unaffected.

3.2 Containment Inservice Inspection Program

3.2.1 ASME Section XI IWE/IWL CISI Program

3.2.1.1 Summary of the CISI Program

In Section 3.5.4, "Containment Inservice Inspection Program [CISI]," of the enclosure to the LAR, the licensee provided the details of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (ASME Code) Section XI, Division 1, CISI program for Grand Gulf. Subsections IWE and IWL of the ASME Code, Section XI, as incorporated by reference in 10 CFR 50.55a, require visual examinations three-times within a 10-year interval for ASME Class Metal Containment (MC) components and their integral attachments (ASME Section XI, Subsection IWE) and two-times within a 10-year interval for ASME Class Concrete Containment (CC) components and their integral attachments (ASME Section XI, Subsection IWL).

The licensee developed the CISI program section for ASME Class CC components and Class MC components for the fourth 10-year CISI interval using the ASME Code, Section XI,

2007 Edition through the 2008 Addenda. The fourth 10-year CISI interval, as provided in Figure 3.5.4-1, "GGNS 4th Interval IWE and IWL Schedule," of the enclosure to the LAR, complies with IWE-2411, which commenced on December 1, 2017, and will end on November 30, 2027. The three periods within the interval were defined in ASME Section XI and are as follows:

- First Period: December 1, 2017, through November 30, 2020 (3 years)
- Second Period: December 1, 2020, through November 30, 2024 (4 years)
- Third Period: December 1, 2024, through November 30, 2027 (3 years)

The licensee proposed the fifth 10-year interval program for the performance of the CISI. The proposed fifth 10-year CISI interval, provided in Figure 3.5.4-2, "GGNS 5th Interval IWE and IWL Schedule," of the enclosure to the LAR, complies with IWE-2411, will commence on December 1, 2027, and will end on November 30, 2037. The proposed three periods, within the interval, are as follows:

- First Period: December 1, 2027, through November 30, 2030 (3 years)
- Second Period: December 1, 2030, through November 30, 2034 (4 years)
- Third Period: December 1, 2034, through November 30, 2037 (3 years)

3.2.1.2 Summary of CISI Examination Results

In Section 3.5.5, "RF20 Summary of Examinations," of the enclosure to the LAR, the licensee provided Tables 3.5.5-2, "Containment Visual Inspection (IWE)," and 3.5.5-3, "Containment Visual Inspection (IWE/IWL)." The Tables provided examination results for the fourth CISI interval RFO 20 suppression pool liner inspection, which included IWE augmented examinations of containment surface areas using appropriate methods specified in Subsection IWE. Components examined included the containment dome and building liner, lower and upper personnel airlock, and suppression pool underwater surfaces.

The results of RFO 19 (spring 2014) and RFO 20 (March 2016) ASME Section XI IWE visual testing (VT) VT-3 visual inspections were characterized by the licensee as "Items were previously identified and evaluated" and "No additional degradation noted." Areas inspected included visual inspection of the containment building dome and liner, underwater surfaces of the suppression pool, and the upper and lower personnel airlocks. Indications noted during the suppression pool liner inspection were determined acceptable by examination in accordance with ASME IWE requirements. Five areas were documented with noted degradations, however the minimum plate thickness for all five areas remained above the nominal plate thickness of 0.225 - 0.250 inch. The inspection results for the last two IWL visual inspections performed in RFO 18 and RFO 20 were characterized by the licensee as "Indications were previously identified and evaluated with no changes."

In the LAR, the licensee identified IWE augmented examination of containment surface areas requiring Category E-C examination. Table 3.5.5-2 of the enclosure to the LAR listed several component identification numbers associated with the containment liner plate and five areas associated with the suppression pool liner, which required ultrasonic examination. The five areas identified were in LAR Table 3.5.5-2 as 1-FP-02F-2, two areas under 1-FP08A-1, 1-FP-040-4 and 1-WP-01C-3. The suppression pool underwater surface indications resulted in a metal loss between 9-55 mils (0.009-0.055 inch), which was determined by the licensee to be

acceptable. The licensee evaluates potential degradation in inaccessible areas in accordance with 10 CFR 50.55a(b)(2)(viii)(E) and 10 CFR 50.55a(b)(2)(ix)(A).

The NRC staff finds the examination results to be acceptable because it demonstrated satisfactory performance and implementation of the CISI program that is consistent with the guidance of NEI 94-01, Revision 2-A.

3.2.1.3 Service Level 1 Containment Coatings and Assessment Program

Sections 3.5.3 “Service Level 1 (SL1) Coatings Assessment,” and 3.7.4, “Protective Coating Monitoring and Maintenance Program,” of the enclosure to the LAR, describe the SL1 Coatings and Assessment Program that monitors the condition of SL1 coatings and provides an effective method to assess coating condition through visual inspections to identify degraded or damaged coatings. In the LAR, the licensee stated that this program provides a common approach in controlling, application, maintaining and periodically assessing SL1 coatings used inside the Grand Gulf containment where the coating failure could adversely affect the operation of emergency core cooling system (ECCS) post-accident fluid systems. The program addresses all coated surfaces inside containment (e.g., steel liner, structural steel, supports, penetrations, and concrete walls and floors) and some Level III coatings outside containment. In LAR Table 3.5.5.2, the licensee presented coating related examination results for the containment liner during RFO 20 (March 2016). A summary of the results concluded that “Items were previously identified and evaluated acceptable” with “No additional degradation noted during this examination.”

According to Entergy’s Program Plan, coating inspections in the drywell are to be performed during RFOs while containment inspections may be performed during operation. The plan states that a general walkdown should be performed during every RFO or other major maintenance outages and may coincide with plant-specific commitments (e.g., plant TS, trending results, IWE/IWL inspections, etc.), which may affect the frequency of coating assessments. The SL1 Protective Coating Program assures the effects of aging are managed such that applicable components will continue to perform their intended functions consistent with the combined licensing basis through the period of extended operation and is consistent with the program described in NUREG-1801, Revision 2, “Generic Aging Lessons Learned (GALL) Report,” Section XI.S8, “Protective Monitoring and Maintenance Coating Program” dated December 2010 (Reference 20). Therefore, the licensee’s SL1 Protective Coating Program seems to be reliable.

3.2.1.4 RFO 22 Containment Testing and Inspection

In the LAR, the licensee stated that Grand Gulf conducted RFO 22 (spring 2020) activities and was performing tests and inspections associated with containment. On April 3, 2020, the licensee reported that 97 of the planned 119 LLRTs have been completed. During RFO 22, the entire IWE scope was performed, except for the suppression pool liner and bolted connections, both of which are only required to be inspected once per interval. In RFO 22, the licensee completed the planned IWE scope, except for a limited portion due to limitations in removing foreign material exclusion protective barriers preventing access to some areas on the containment liner. As of the LAR submittal, all inspection results were under review, but there had been no significant findings. In the LAR, the licensee also stated the structural integrity walkdowns performed for RFO 22 did not identify any new or significant issues; and that Entergy did not perform any IWE or IWL inspections during RFO 21 (spring 2018).

Based on the above, the NRC staff finds that the licensee has an adequate CISI program in place as demonstrated by the implementation of overlapping inspection activities performed as part of the IWE/IWL programs and activities developed to support renewal of the original operating license, inspections of SL1 protective coatings, and maintenance rule structural monitoring program. These programs periodically examine, monitor and manage structural deterioration and aging degradation of the Grand Gulf containment pressure boundary such that the primary containment can perform its intended function as a leaktight barrier consistent with the guidance contained in NEI 94-01.

3.2.2 Operating Experience Evaluations of NRC Information Notices

In Section 3.6.1 of the enclosure to the LAR, the licensee reviewed for applicability to Grand Gulf of NRC Information Notice (IN) 1992-20, "Inadequate Local Leak Rate Testing," dated March 3, 1992 (Reference 21). The NRC issued this IN to alert licensees to problems with local leak rate testing of two-ply stainless-steel bellows used on piping penetrations at some plants. The licensee stated that Grand Gulf has only one bellows, the expansion bellows (1G41G515) associated with the horizontal fuel transfer tube (Containment Penetration No. 4), that may be subject to the failure mechanism described in IN 92-20. The licensee stated that Grand Gulf conducted testing that provided a high degree of confidence that the test methods used were adequate to detect leakage across the bellows assembly. The licensee also stated that the bellows are not subjected to large or rapid temperature changes or other operationally induced stresses.

In Section 3.6.2 of the enclosure to the LAR, the licensee reviewed for applicability to Grand Gulf, NRC IN 2010-12, "Containment Liner Corrosion," dated June 18, 2010 (Reference 22). The NRC issued this IN to inform licensees of issues concerning the degradation (corrosion) of the containment liner that could affect the leaktightness of the containment structure. Specifically, corrosion that originates between the liner plate and concrete is a greater concern because visual examinations typically identify the corrosion only after it has significantly degraded the liner. In the LAR, the licensee stated, in part, that "Based on the Operating Experience evaluation, GGNS is susceptible to the corrosion on the liner plates but GGNS currently has barriers in place to minimize the likelihood of this event." The licensee's evaluation concluded that no new actions were required to address this IN since Grand Gulf currently performs containment liner exams every inspection period and concrete exams every 5 years.

In Section 3.6.3 of the enclosure to the LAR, the licensee reviewed NRC IN 2014-07, "Degradation of Leak Chase Channel Systems for Floor Welds of Metal Containment Shell and Concrete Containment Metallic Liner," dated May 5, 2014 (Reference 23). The NRC issued this IN to inform licensees of issues concerning degradation of floor weld leak chase channel systems of steel containment shell and concrete containment metallic liner that could affect leaktightness and aging management of containment structures. The IN describes Operating Experience that is concerned about the omission of Code-required examinations that are masked by other components, and therefore, are not included in the IWE database. The licensee's evaluation concluded that Grand Gulf is not at risk, as the leak chase system of the containment is included in the Grand Gulf CISI program, therefore, no new actions are required to address this IN.

3.2.3 Limitations and Conditions Applicable to NEI 94-01, Revision 2-A

In the NRC SER dated June 25, 2008, the NRC staff concluded that the guidance in NEI 94-01, Revision 2, is acceptable for reference by licensees proposing to amend their TS regarding containment leakage rate testing, subject to six conditions. The requirements of NEI 94-01 stayed essentially the same from the original version through Revision 2 except that the regulatory positions of RG 1.163 were incorporated and the maximum ILRT interval extended to 15 years. The licensee had taken an exemption to RG 1.163 guidance and used an alternate methodology, which was acceptable to the NRC staff.

In Table 3.8.1-1, "NEI 94-01, Revision 2-A Limitations and Conditions," of the enclosure to the LAR, the licensee described its responses to the six conditions identified in the SE dated June 25, 2008. The NRC staff has evaluated these responses to determine whether the licensee adequately addressed these conditions.

3.2.3.1 NEI 94-01, Revision 2-A, Condition 1

Limitation and Condition 1 of NEI 94-01, Revision 2-A states:

For calculating the Type A leakage rate, the licensee should use the definition in the NEI TR 94-01, Revision 2, in lieu of that in [American National Standards Institute/American Nuclear Society] ANSI/ANS-56.8-2002.

The licensee stated in Section 3.8.1 of the enclosure to the LAR that Grand Gulf will use the definition in NEI 94-01 Revision 3-A, Section 5.0. This definition has remained unchanged from Revision 2-A to Revision 3-A of NEI 94-01 and is the one identified as acceptable and, therefore, the licensee has addressed and satisfied NRC Condition 1.

3.2.3.2 NEI 94-01, Revision 2-A, Condition 2

Limitation and Condition 2 of NEI 94-01, Revision 2-A states:

The licensee submits a schedule of containment inspections to be performed prior to and between Type A tests.

The licensee provided a discussion of the containment inspection program and schedule in Section 3.5.4, Table 3.5.4-1, and Figures 3.5.4-1 and 3.5.4-2, of the enclosure to the LAR. Therefore, the licensee addressed and satisfied NRC Condition 2.

3.2.3.3 NEI 94-01, Revision 2-A, Condition 3

Limitation and Condition 3 of NEI 94-01, Revision 2-A states:

The licensee addresses the areas of the containment structure potentially subjected to degradation.

In Section 3.8.1 of the enclosure to the LAR, the licensee referred to Section 3.5.4, Tables 3.5.4-6, "GGNS Unit 1 Code Category IWE Summary," and 3.5.4-7, "GGNS Unit 1 Code Category IWL Summary," which discusses areas of the Grand Gulf containment building that may be subjected to degradations for Class MC and Class CC examinations. The licensee stated that inspection evaluations for the fourth inspection interval, which began

December 1, 2017, are performed in accordance with ASME Section XI, 2007 Edition through the 2008 Addenda, and the acceptance of components for continued service are subject to the rules of Articles IWE-3000 and IWL-3000 as well as the regulatory amendments in 10 CFR 50.55a. The licensee also stated that the evaluations are performed by the Responsible Individual for IWE and by the Registered Professional Engineer for IWL.

The licensee provided the results of the IWE inspections in RFO 20 (March 2016) of suppression pool underwater surfaces, containment dome liner, and lower and upper personnel airlocks in Table 3.5.5-2 of the enclosure to the LAR, and the inspection results were evaluated and characterized as "Items were previously identified and evaluated acceptable" with "No additional degradation noted during this examination." The licensee also provided the results of IWL inspections in RFO 20 (March 2016) and RFO 18 (April 2012) for components in Table 3.5.5-3 of the enclosure to the LAR, and the inspection results were evaluated and characterized as "Indications were previously identified and evaluated" with "No changes."

Based on the information above, the NRC staff finds that the licensee provided an acceptable level of information about recent IWE and IWL inspections that were evaluated as acceptable and performed in accordance with the ASME Code, Section XI. Therefore, the NRC staff concludes that the licensee has adequately addressed Condition 3.

3.2.3.4 NEI 94-01, Revision 2-A, Condition 4

Limitation and Condition 4 of NEI 94-01, Revision 2-A states:

The licensee addresses any tests and inspections performed following major modifications to the containment structure, as applicable.

In Table 3.8.1-1 of the enclosure to the LAR, the licensee stated that, "There had been no major containment repairs or modifications performed on the GGNS Containment Vessel." The NRC staff finds that the licensee adequately addresses Condition 4.

3.2.3.5 NEI 94-01, Revision 2-A, Condition 5

Limitation and Condition 5 of NEI 94-01, Revision 2-A states:

The normal Type A test interval should be less than 15 years. If a licensee has to utilize the provision of Section 9.1 of NEI 94-01, Revision 2, related to extending the ILRT interval beyond 15 years, the licensee must demonstrate to the NRC staff that it is an unforeseen emergent condition.

In response to Condition 5, the licensee indicated acknowledgement and acceptance of this NRC staff position. Therefore, the licensee addressed and satisfied NRC Condition 5.

3.2.3.6 NEI 94-01, Revision 2-A, Condition 6

Limitation and Condition 6 of NEI 94-01, Revision 2-A states:

For plants licensed under 10 CFR Part 52, applications requesting a permanent extension of the ILRT surveillance interval to 15 years should be deferred until after the construction and testing of containments for that design have been completed and applicants have confirmed the applicability of NEI 94-01,

Revision 2, and EPRI Report No. 1009325, Revision 2, including the use of past ILRT data.

The NRC staff found that Condition 6 is not applicable to Grand Gulf because it was not licensed under 10 CFR Part 52.

3.3 Risk Insights

The licensee stated that the proposed amendment is risk-informed and follows the guidance in RG 1.174, Revision 3, and RG 1.200 Revision 2. The licensee also stated that it has performed a Grand Gulf specific evaluation to assess the risk impact of the proposed amendment.

Section 9.2.3.1 of NEI 94-01, Revision 3--A, discusses how plant specific confirmatory analyses are required when extending the Type A ILRT interval beyond 10 years. Section 9.2.3.4, "Plant Specific Confirmatory Analyses," of NEI 94-01, Revision 3--A states, in part, that:

The assessment should be performed using the approach and methodology described in EPRI Report 1018243, "Risk Impact Assessment of Extended Integrated Leak Rate Testing Intervals." The analysis is to be performed by the licensee and retained in the plant documentation and records as part of the basis for extending the ILRT interval.

In the SER dated June 25, 2008, the NRC staff found the methodology in NEI 94-01, Revision 2, and EPRI TR-1009325, Revision 2, acceptable for referencing by licensees proposing to amend their TSs to permanently extend the ILRT interval to 15 years, provided certain conditions are satisfied. These conditions, set forth in Section 4.2 of the SER for EPRI TR-1009325, Revision 2, indicate that:

1. The licensee submits documentation indicating that the technical adequacy of its PRA is consistent with the requirements of RG 1.200, relevant to the ILRT extension application.
2. The licensee submits documentation indicating that the estimated risk increase associated with permanently extending the ILRT surveillance interval to 15 years is small and consistent with the clarification provided in Section 3.2.4.6 of the SER for EPRI TR-1009325, Revision 2.
3. The methodology in EPRI TR-1009325, Revision 2, is acceptable provided the average leak rate for the preexisting containment large leak accident case (i.e., accident case 3b) used by licensees is assigned a value of 100 times the L_a instead of 35 L_a .
4. A LAR is required in instances where containment overpressure is relied upon for ECCS performance.

Additional application specific guidance on the technical adequacy of a PRA used to extend ILRT intervals is provided in Section 3.2.4 of the SER for EPRI TR-1009325, Revision 2. Section 3.2.4.6 of the SER addresses use of risk acceptance guidelines from RG 1.177 to be considered. According to the clarification provided in Section 3.2.4.6 of the NRC SER for NEI 94-01, Revision 2, and EPRI TR-1009325, Revision 2, plants that rely on containment overpressure (or containment accident pressure) net positive suction head for ECCS injection must also consider core damage frequency (CDF) in the ILRT evaluation.

3.3.1 Plant Specific Risk Evaluation

The licensee addressed each of the four conditions for the use of EPRI TR-1009325, Revision 2, which are listed in Section 4.2 of the June 25, 2008, NRC SER for NEI 94-01, Revision 2. A summary of how each condition is met is provided in Sections 3.3.1.1 through 3.3.1.4 below.

3.3.1.1 PRA Quality – Condition 1

RG 1.200 describes one acceptable approach for determining whether the technical adequacy of the PRA, in total, or the parts that are used to support an application, is sufficient to provide confidence in the results, such that the PRA can be used in regulatory decisionmaking for light-water reactors.

Consistent with the information provided in Regulatory Issue Summary 2007-06, “RG 1.200 Implementation,” dated March 22, 2007 (Reference 24), the NRC staff will use Revision 2 of RG 1.200 to assess technical adequacy of the PRA used to support risk-informed applications received after March 2010. In Section 3.2.4.1 of the SER for NEI 94-01, Revision 2, and EPRI TR-1009325, Revision 2, the NRC staff states that Capability Category I of the ASME PRA standard shall be applied as the standard for assessing PRA quality for ILRT extension applications, since approximate values of CDF and large early release frequency (LERF) and their distribution among release categories are sufficient to support the evaluation of changes to ILRT frequencies.

The licensee addresses the Grand Gulf PRA technical adequacy in Section 3.4.2, “PRA Technical Adequacy,” and Attachment 4, “Grand Gulf Nuclear Station: Evaluation of Risk Significance of Permanent ILRT Extension,” Appendix A, “PRA Technical Adequacy,” of the enclosure to the LAR. As discussed in Appendix A to Attachment 4, the Grand Gulf risk assessment performed to support the ILRT application utilized the current Grand Gulf PRA model of record, which is Revision 4b. This model and its technical contents were constructed and documented to meet the ASME/ANS PRA standard. The Grand Gulf PRA model Revision 4b meets the ASME/ANS PRA standard Capability Category II of the supporting requirements. The licensee stated that its approach for maintaining, updating and documenting the PRA models is controlled by procedures consistent with the guidance of the ASME/ANS PRA standard.

The licensee stated that the Grand Gulf PRA model has undergone several peer reviews. A full-scope industry peer review of the Grand Gulf PRA model Revision 4 was conducted by the BWR Owners Group in September 2015. This peer review documented 66 new facts and observations (F&Os) including 39 findings, 26 suggestions, and 1 best practice. All finding-level F&Os from the 2015 full-scope industry PRA peer review have been closed by an independent assessment conducted in August 2017. In Attachment 4 of the enclosure to the LAR, the licensee provided Table A-1, “Table A-1, List of Finding F&Os on the Grand Gulf Internal Events PRA Model,” which includes the resolutions and conclusions of the F&Os. Table A-1 also documents the basis for each F&O to validate whether the F&O constituted a PRA upgrade, maintenance update, or other; and documents the results from the independent assessment team review of the supporting requirements to ensure that Capability Category II of the ASME PRA standard was met for the F&Os. No finding level F&Os remain open for the Grand Gulf internal events PRA.

Grand Gulf does not currently have a fire PRA model. The results of the fire risk assessment performed for the Individual Plant Examination of External Events (IPEEE) are used for this analysis. The Grand Gulf IPEEE calculated a fire CDF of $2.74E-05$. Since no LERF value is directly provided, the fire LERF is estimated as 10 percent of the fire CDF to obtain a fire LERF of $2.74E-06$. In support of the 10 percent fire LERF to CDF ratio, the licensee provided ratios from other Mark III containment plants, and the ratio from the Grand Gulf severe accident mitigation alternatives, which are provided in the LAR. The licensee stated that the LERF/CDF ratio is typically about 5 percent.

The seismic PRA results from the IPEEE seismic margins analysis do not result in an estimate of CDF. The 2014 seismic reevaluations for operating reactor sites, NEI "Seismic Risk Evaluations for Plants in the Central and Eastern United States" (Reference 25), confirm the 2010 Generic Issue (GI)-199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants" (Reference 26), conclusions remain valid for estimating seismic CDF at plants in the central and eastern United States, which includes Grand Gulf. The average of the seismic CDF values reported in Table D-1 of GI-199 is calculated to be $8.38E-06$. Similar to fire, the seismic LERF is estimated by applying a 10 percent LERF/CDF ratio, yielding an estimated seismic LERF of $8.38E-7$.

Based on review of the above information, the NRC staff finds that the licensee has addressed the relevant findings and gaps from the peer reviews and that they have no impact on the results of this LAR. Therefore, the NRC staff concludes that the PRA models used by the licensee are of sufficient quality to support the evaluation of changes to the ILRT frequencies. Accordingly, the first condition is satisfied.

3.3.1.2 Estimated Risk Increase – Condition 2

The guidance in RG 1.174 and in Section 4.2 of the NRC SER for NEI 94-01, Revision 2, and EPRI TR-1009325, Revision 2 provide clarification on this condition. Specifically, a "small" increase in population dose should be defined as an increase in population dose of less than or equal to either 1.0 person-rem (roentgen equivalent man) per year or 1 percent of the total population dose, whichever is less restrictive. In addition, a "small" increase in conditional containment failure probability (CCFP) should be defined as a value marginally greater than that accepted in previous one-time 15-year ILRT extension requests. This would require that the increase in CCFP be less than or equal to 1.5 percentage points.

The licensee reported the results of the plant specific risk assessment in Section 5.2 and the sensitivity calculations in Section 5.3 of Attachment 4 of the enclosure to the LAR. The reported risk impacts are based on a change in the containment ILRT frequency from three tests in 10 (3-in-10) years (the test frequency under 10 CFR 50 Appendix J, Option A) to one test in 15 (1-in-10) years and account for the risk from undetected containment leaks due to steel liner corrosion. The risk change resulting from a change in the containment ILRT test interval from 3-in-10 years to 1-in-15 years bounds the 1-in-10 years to 1-in-15 years risk change. The following conclusions can be drawn from the licensee's analysis associated with extending the containment ILRT frequency:

1. RG 1.174 defines "very small" changes in risk as resulting in increases of CDF less than $1.0E-06$ /year and increases in LERF less than $1.0E-07$ /year. The licensee stated that since the ILRT does not impact CDF, the relevant criterion is LERF. The increase in internal events LERF resulting from a change in the containment ILRT test interval from 3-in-10 years to 1-in-15 years is estimated as $1.66E-08$ /year using the EPRI guidance.

This value increases negligibly if the risk impact of corrosion-induced leakage of the steel liners occurring and going undetected during the extended test interval is included. As such, the estimated change in LERF is determined to be “very small” using the acceptance guidelines of RG 1.174.

When external event risk is included, the increase in LERF resulting from a change in the containment ILRT test interval from 3-in-10 years to 1-in-15 years is estimated as $3.12\text{E-}07/\text{year}$ using the EPRI guidance, and total LERF is $4.66\text{E-}06/\text{year}$. The guidance in RG 1.174 states that when the calculated increase in LERF is in the “small” range of $1.0\text{E-}07/\text{year}$ to $1.0\text{E-}06/\text{year}$, applications will be considered only if it can be reasonably shown that the total LERF is less than $1.0\text{E-}05/\text{year}$. As such, the estimated change in LERF is determined to be “small” using the acceptance guidelines of RG 1.174. The risk change resulting from a change in the containment ILRT test interval from 3-in-10 years to 1-in-15 years bounds the 1-in-10 years to 1-in-15 years risk change. When external event risk is included, the increase in LERF resulting from a change in the containment ILRT test interval from 1-in-10 years to 1-in-15 years is estimated as $1.30\text{E-}07$ and the total LERF is $4.48\text{E-}06$. Therefore, the risk increase is also “small” using the acceptance guidelines of RG 1.174.

The effect resulting from changing the Type A test frequency to 1-in-15 years, measured as an increase to the total integrated plant risk for those accident sequences influenced by Type A testing, is 0.006 person-rem/year. NEI 94-01 states that a “small” population dose is defined as an increase of ≤ 1.0 person-rem/year, or ≤ 1 percent of the total population dose, whichever is less restrictive for the risk impact assessment of the extended ILRT intervals. The reported increase in total population dose is below the acceptance criteria provided in EPRI TR-1009325, Revision 2-A, and defined in Section 3.2.4.6 of the NRC SER for NEI 94-01, Revision 2. Thus, the increase in the total integrated plant risk for the proposed change is considered “small” and supportive of the proposed change.

2. The increase in the CCFP from the 3--in-10-year interval to 1-in-15-year interval is 0.642 percent. NEI 94-01, Revision 2-A states that increases in CCFP of ≤ 1.5 percent are “small.” This value is below the acceptance guidelines in Section 3.2.4.6 of the NRC SER for NEI 94-01, Revision 2, and supportive of the proposed change.

Based on the risk assessment results, the NRC staff concludes that the increase in LERF is “small” and consistent with the acceptance guidelines of RG 1.174, and the increase in the total population dose, and the magnitude of the change in the CCFP for the proposed change are also “small.” Accordingly, the second condition is met.

3.3.1.3 Leak Rate for the Large Preexisting Containment Leak Rate Case – Condition 3

As provided in Section 4 of Attachment 4 of the enclosure to the LAR, the licensee stated that the representative containment leakage for Class 3b sequences is $100 L_a$ based on the guidance provided in EPRI TR-1009325, Revision 2-A (EPRI TR-1018243). Accordingly, the third condition is met.

3.3.1.4 Containment Overpressure is Relied Upon for ECCS Performance – Condition 4

In Section 3.2, “Emergency Core Cooling system (ECCS) Net Positive Suction Head (NPSH) Analysis,” of the enclosure to the LAR, the licensee stated that no credit is taken for the

increase in containment pressure due to an accident (containment over pressurization). Thus, no reliance is placed on pressure or temperature transients to ensure adequate net positive suction head. Accordingly, the fourth condition is not applicable.

3.4 Technical Evaluation Summary

Based on its review, the NRC staff finds that the licensee effectively manages existing CISI programs of IWE and IWL to the requirements of ASME Section XI and the conditions in 10 CFR Part 50.55a, and responsively addresses industry events for applicability to Grand Gulf. Therefore, the NRC staff concludes that the periodic effective visual inspection programs as part of the containment leakage rate testing provide reasonable assurance in granting permanent extension approval of the containment ILRT interval from 10 to 15 years.

Based on its review of the LAR, the NRC staff finds that the licensee has adequately implemented its primary containment leakage rate testing program consisting of ILRT and LLRT. The results of the recent ILRTs and of LLRT combined totals demonstrate acceptable performance and support a conclusion that the structural and leaktight integrity of the primary containment vessel is adequately managed and will continue to be periodically monitored and managed effectively by the licensee's Primary Containment Leakage Rate Testing Program. The NRC staff finds that the licensee has addressed the limitations and conditions identified in the NRC staff SE incorporated in TR NEI 94-01, Revision 2-A. Therefore, the NRC staff finds the proposed changes to Grand Gulf TS 5.5.12 regarding the primary containment leakage rate testing program are acceptable and continue to meet 10 CFR 50.36(c)(5) by providing administrative controls necessary to assure operation of the facility in a safe manner.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the relevant Mississippi State official was notified of the proposed issuance of the amendment on November 19, 2020. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes requirements with respect to installation or use of facility components located within the restricted area as defined in 10 CFR Part 20 and changes surveillance requirements. 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, published in the *Federal Register* on April 7, 2020 (85 FR 19510), and there has been no public comment on such finding. 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.

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Date: February 24, 2021

SUBJECT: GRAND GULF NUCLEAR STATION, UNIT 1 – ISSUANCE OF AMENDMENT NO. 227 RE: EXTENSION OF APPENDIX J INTEGRATED LEAKAGE TEST INTERVAL (EPID L-2020-LLA-0027) DATED FEBRUARY 24, 2021

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