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

May 11, 2012

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 RE: REVISON TO TECHNICAL SPECIFICATION 3.1.7, "STANDBY LIQUID CONTROL (SLC) SYSTEM" (TAC NO. ME7860)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 190 to Facility Operating License No. NPF-29 for the Grand Gulf Nuclear Station, Unit 1 (GGNS). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated January 23, 2012, as supplemented by letter dated March 21, 2012.

The amendment revises TS 3.1.7, "Standby Liquid Control (SLC) System." The license amendment request (LAR) reflects the enrichment of the Boron-10 (B-10) isotope in the sodium pentaborate (SPB) solution, which is the credited neutron absorber. Increasing the enrichment of the B-10 isotope in the SPB solution effectively increases the available negative reactivity inserted by the SLC system without having to increase the system's storage capacity. In addition, changes to the SLC system increase the operating temperature range and decrease the solution volume. TS 3.1.7 has been reformatted so that Figures 3.1.7-1 and 3.1.7-2 can be deleted and replaced with various new action conditions and surveillance requirements. These changes to TS 3.1.7 were originally included as part of the GGNS Extended Power Uprate (EPU) LAR dated September 8, 2010. Due to delays in obtaining approval of the EPU LAR and the need for the SLC system changes to support operation with the Cycle 19 core design, Entergy Operations, Inc. (the licensee), submitted this request separately. The change is needed to ensure appropriate shutdown margin can be maintained during reload design for future cycles beginning with Cycle 19.

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

Sincerely,

Alan Wang

Alan Wang, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosures:
1. Amendment No. 190 to NPF-29
2. Safety Evaluation

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UNITED STATES
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WASHINGTON, D.C. 20555-0001

ENTERGY OPERATIONS, INC.

SYSTEM ENERGY RESOURCES, INC.

SOUTH MISSISSIPPI ELECTRIC POWER ASSOCIATION

ENTERGY MISSISSIPPI, INC.

DOCKET NO. 50-416

GRAND GULF NUCLEAR STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 190
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 January 23, 2012, as supplemented by letter dated March 21, 2012, 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 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. 190 are hereby incorporated in the 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 prior to startup from the spring 2012 refueling outage.

FOR THE NUCLEAR REGULATORY COMMISSION

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Date of Issuance: May 11, 2012

ATTACHMENT TO LICENSE AMENDMENT NO. 190

FACILITY OPERATING LICENSE NO. NPF-29

DOCKET NO. 50-416

Replace the following pages of the 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.

Facility Operating License

Remove	Insert
-4-	-4-

Technical Specifications

Remove	Insert
3.1-21	3.1.21
3.1-22	3.1-22
3.1-23	3.1-23
3.1-24	--
3.1-25	--

(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 license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10CFR 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 3898 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. 190 are hereby incorporated into this 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.

3.1 REACTIVITY CONTROL SYSTEMS

3.1.7 Standby Liquid Control (SLC) System

LCO 3.1.7 Two SLC subsystems shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. Product of Sodium Pentaborate concentration in weight percent (C) times Boron-10 enrichment in atom percent (E) < 420	A.1	Restore (C)(E) ≥ 420	8 hours
B. Sodium pentaborate solution volume < 4,200 gallons.	B.1	Restore Volume to ≥ 4,200 gallons.	8 hours
C. Sodium pentaborate solution temperature < 45°F or > 150°F.	C.1	Restore temperature to ≥ 45°F and ≤ 150°F.	8 hours
D. One SLC subsystem inoperable for reasons other than Conditions A, B or C.	D.1	Restore SLC subsystem to OPERABLE status.	7 days
E. Two SLC subsystems inoperable for reasons other than Conditions A, B or C.	E.1	Restore one SLC subsystem to OPERABLE status.	8 hours
F. Required Action and associated Completion Time not met.	F.1	Be in MODE 3.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.7.1	Verify available volume of sodium pentaborate solution is ≥ 4,200 gallons.	24 hours
SR 3.1.7.2	Verify temperature of sodium pentaborate solution is ≥ 45°F and ≤ 150°F.	24 hours
SR 3.1.7.3	----------NOTE---------- Sodium pentaborate concentration (C), in weight percent, is determined by the performance of SR 3.1.7.5. Boron-10 enrichment (E), in atom percent, is determined by the performance of SR 3.1.7.9. ---------- Verify SLC System satisfies the following equation: (C)(E) ≥ 420	31 days
SR 3.1.7.4	Verify continuity of explosive charge.	31 days
SR 3.1.7.5	Verify the percent weight of sodium pentaborate in solution is ≤ 9.5%.	31 days AND Once within 24 hours after water or boron is added to solution AND Once within 24 hours after solution temperature is restored to ≥ 45°F

(continued)

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.1.7.6	Verify each SLC subsystem manual, power operated, and automatic valve in the flow path that is not locked, sealed, or otherwise secured in position, is in the correct position, or can be aligned to the correct position.	31 days
SR 3.1.7.7	Verify each pump develops a flow rate ≥ 41.2 gpm at a discharge pressure ≥ 1340 psig.	In accordance with the Inservice Testing Program
SR 3.1.7.8	Verify flow through one SLC subsystem from pump into reactor pressure vessel.	18 months on a STAGGERED TEST BASIS
SR 3.1.7.9	Determine Boron-10 enrichment in atom percent (E).	Once within 24 hours after boron is added to the solution.
SR 3.1.7.10	Verify piping between the storage tank and the pump suction is not blocked.	Once within 24 hours after solution temperature is restored to ≥ 45°F

UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 190 TO

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 January 23, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12023A242), as supplemented by letter dated March 21, 2012 (ADAMS Accession No. ML12082A039), Entergy Operations, Inc. (Entergy, the licensee), requested changes to the Technical Specifications (TSs) for Grand Gulf Nuclear Station, Unit 1 (GGNS). The supplemental letter dated March 21, 2012, 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) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on February 7, 2012 (77 FR 6148).

The proposed changes would revise TS 3.1.7, "Standby Liquid Control (SLC) System." The proposed license amendment request (LAR) reflects the enrichment of the Boron-10 (B-10) isotope in the sodium pentaborate (SPB) solution, which is the credited neutron absorber. Increasing the enrichment of the B-10 isotope in the SPB solution effectively increases the available negative reactivity inserted by the SLC system without having to increase the system's storage capacity. In addition, changes to the SLC system increase the operating temperature range and decrease the solution volume. TS 3.1.7 has been reformatted so that Figures 3.1.7-1 and 3.1.7-2 can be deleted and replaced with various new action conditions and surveillance requirements (SR). These proposed changes were originally included as part of the GGNS extended power uprate (EPU) LAR dated September 8, 2010 (ADAMS Accession No. ML102660403). Due to delays in obtaining approval of the EPU LAR and the need for the SLC system changes to support operation with the Cycle 19 core design, Entergy submitted this request separately. The proposed change is needed to ensure appropriate shutdown margin can be maintained during reload design for future cycles beginning with Cycle 19.

2.0 REGULATORY EVALUATION

The NRC's regulatory requirements related to the content of the TSs are contained in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36, "Technical specifications." Pursuant to 10 CFR 50.36, TSs 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) limiting conditions for operation (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 TSs.

The regulations in 10 CFR 50.36(c)(2)(i), "Limiting conditions for operations," state, in part, that

> 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.

The regulations in 10 CFR 50.36(c)(3), "Surveillance requirements," state that

> 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.

The shutdown capability requirement of the standby liquid control (SLC) system during normal operations is specified in 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 26, "Reactivity control system redundancy and capability." Compliance with GDC 26 requires two independent reactivity control systems of different design principles be provided, with one of the systems being capable of holding the reactor core subcritical under cold conditions. The control rods provide the normal method for reactivity control and are capable of maintaining the reactor subcritical, including allowance for a stuck rod, without the addition of any soluble neutron absorber (i.e., boron) to the reactor coolant.

The SLC system functions as a backup to inserting control rods providing a diverse means of rendering the reactor subcritical. To comply with GDC 26, the SLC system must have an adequate amount of neutron absorber in solution, and the capability to inject at a rate sufficient to bring the reactor from rated power to cold shutdown at any time in core life with the control rods remaining withdrawn. The SLC system must also take into account the reactivity gains from complete decay of the xenon inventory derived from rated power operation, an allowance for imperfect mixing and leakages, and dilution by the residual heat removal system.

The SLC system is also required to comply with paragraph (c)(4) of 10 CFR 50.62, "Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light-water-cooled nuclear power plants," which states that

> Each boiling water reactor must have a standby liquid control system (SLCS) with the capability of injecting into the reactor pressure vessel a borated water

solution at such a flow rate, level of boron concentration and boron-10 isotope enrichment, and accounting for reactor pressure vessel volume, that the resulting reactivity control is at least equivalent to that resulting from injection of 86 gallons per minute of 13 weight percent sodium pentaborate decahydrate solution at the natural boron-10 isotope abundance into a 251-inch inside diameter reactor pressure vessel for a given core design. The SLCS and its injection location must be designed to perform its function in a reliable manner. The SLCS initiation must be automatic and must be designed to perform its function in a reliable manner for plants granted a construction permit after July 26, 1984, and for plants granted a construction permit prior to July 26, 1984, that have already been designed and built to include this feature.

NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR Edition" (SRP), Section 6.1.1, "Engineered Safety Features Materials," and Section 6.5.2, "Containment Spray as a Fission Product Cleanup System," require the pH of the suppression pool water be controlled to maintain a minimum pH value of 7.0 following a loss-of-coolant accident (LOCA). This is to prevent re-evolution of iodine that has been removed from the containment and the drywell atmosphere after having been released from the core during the LOCA.

3.0 TECHNICAL EVALUATION

3.1 Proposed TS Changes

In its letter dated January 23, 2012, as supplemented by letter dated March 21, 2012, the licensee proposed the following changes to TS 3.1.7.

Changes to TS 3.1.7 Conditions, Required Actions, and Completion Times

Current Condition A states:

A. Concentration of boron in solution in Limited Operation region.

Revised Condition A would state:

A. Product of Sodium Pentaborate concentration in weight percent (C) times Boron-10 enrichment in atom percent (E) < 420

Current Required Actions A.1 and A.2 and the associated Completion Times state:

A.1	Restore concentration of boron in solution to Normal Operation region.	72 hours
AND		
A.2	Perform SR 3.1.7.2.	Once per 4 hours

The revised Required Action A and the associated Completion Time would state:

A.1	Restore (C) (E) $\geq$ 420	8 hours

The licensee proposed revising the existing Action A Condition, Required Actions A.1 and A.2, and the associated Completion Times to reflect that the product of the SPB solution concentration in weight percent (C) and the B-10 enrichment in atom percent (E) in the SPB solution be greater than or equal to 420 or be restored within 8 hours.

New Condition B would state:

B. Sodium pentaborate solution volume < 4,200 gallons.

New Required Action B.1 and the associated Completion Time would state:

B.1	Restore Volume to $\geq$ 4,200 gallons.	8 hours

The license proposed adding new Action B Condition, Required Action B.1, and the associated Completion Time to address the SPB solution volume. The proposed SPB solution volume is required to be greater than or equal to 4,200 gallons. A Completion Time of 8 hours to restore the SPB volume when found to be less than 4,200 gallons is proposed. This Completion Time is consistent with the Completion Time allowed for the restoration of one SLC subsystem when two SLC subsystems are inoperable.

New Condition C would state:

C. Sodium pentaborate solution temperature < 45°F or >150°F.

New Required Action C.1 and the associated Completion Time would state:

C.1	Restore temperature $\geq$ 45°F and $\leq$ 150°F.	8 hours

The licensee proposed adding new Action C Condition, Required Action C.1, and the associated Completion Time to address the SPB solution temperature. A temperature range of greater than or equal to 45 degrees Fahrenheit (°F) and less than or equal to 150 °F is proposed. A Completion Time of 8 hours to restore temperature to within its specified limits is proposed. This completion time is consistent with the Completion Time allowed for restoring one SLC subsystem when two subsystems are inoperable.

In addition, the licensee proposed that existing Action B Condition and Required Action B.1 would be renumbered as Action D and Required Action D.1, respectively; existing Action C Condition and Required Action C.1 would be renumbered as Action E and Required Action E.1, respectively; and existing Action D Condition and Required Action D.1 would be renumbered as Action F and Required Action F.1, respectively. The licensee also proposed revising renumbered Conditions D and E to clarify that they are applicable only when subsystems are "inoperable for reasons other than Conditions A, B or C."

Changes to TS 3.1.7 Surveillance Requirements and Frequencies

Current SR 3.1.7.1 and the associated Frequency state:

SR 3.1.7.1	Verify available volume of sodium pentaborate solution is within the limits of Figure 3.1.7-1.	24 hours

Revised SR 3.1.7.1 and the associated Frequency would state:

SR 3.1.7.1	Verify available volume of sodium pentaborate solution is ≥ 4,200 gallons.	24 hours

The licensee proposed revising SR 3.1.7.1 to verify the available volume of the SPB solution is greater than or equal to 4,200 gallons. This change eliminates the reference to Figure 3.1.7-1.

Current SR 3.1.7.2 and the associated Frequency state:

SR 3.1.7.2	Verify temperature of sodium pentaborate solution is within the limits of Figure 3.1.7-2.	24 hours

Revised SR 3.1.7.2 and the associated Frequency would state:

SR 3.1.7.2	Verify temperature of sodium pentaborate solution is ≥ 45°F and ≤ 150°F.	24 hours

The licensee proposed revising SR 3.1.7.2 to verify the temperature of the SPB solution is greater than or equal to 45 °F and less than or equal to 150 °F. This change eliminates the reference to Figure 3.1.7-2. Also, since Figures 3.1.7-1 and 3.1.7-2 would be deleted, a note would be added to TS page 3.1-23 stating that the next page is 3.1-26. This is an administrative change that allows the current TS page numbering to remain the same.

Current SR 3.1.7.3 and the associated Frequency state:

SR 3.1.7.3	Verify temperature of pump suction piping is ≥ 75°F and ≤ 130°F.	24 hours

The current SR 3.1.7.3 would be deleted. New SR 3.1.7.3 and the associated Frequency would state:

SR 3.1.7.3	----------NOTE---------- Sodium pentaborate concentration (C), in weight percent, is determined by the performance of SR 3.1.7.5. Boron-10 enrichment (E), in atom percent, is determined by the performance of SR 3.1.7.9. ---------- Verify SLC System satisfies the following equation: (C) (E) ≥ 420	31 days

SR 3.1.7.3, which currently requires verification of the temperature of the pump suction piping, would be deleted. Verification of pump suction piping temperature will be performed as part of the proposed SR 3.1.7.2, as described in the TS Bases markup. The licensee proposed adding new SR 3.1.7.3 that requires verification that the product (C)(E) is greater than or equal to 420. A new note would be added to address the association of SRs 3.1.7.5 and 3.1.7.9 to this SR. The proposed Frequency is 31 days and is consistent with the Frequency of SR 3.1.7.5, which requires verification of the concentration of the SPB solution.

Current SR 3.1.7.5 and the associated Frequency state:

SR 3.1.7.5	Verify the concentration of boron in solution is within the limits of Figures 3.1.7-1 and 3.1.7-2.	31 days AND Once within 24 hours after water or boron is added to solution AND Once within 24 hours after solution temperature is restored to ≥ 75°F

Revised SR 3.1.7.5 and the associated Frequency would state:

SR 3.1.7.5	Verify the percent weight of sodium pentaborate solution (C) is ≤ 9.5%.	31 days AND Once within 24 hours after water or boron is added to solution AND Once within 24 hours after solution temperature is restored to ≥ 45°F

SR 3.1.7.5 would be revised to verify the concentration of SPB solution is less than or equal to 9.5 weight percent (w/o). The temperature listed in the Frequency associated with performing the SR any time the solution low temperature is restored to within limits would be revised to greater than or equal to 45 °F. The change in temperature is consistent with the proposed operating temperature band.

Current SR 3.1.7.7 and the associated Frequency state:

SR 3.1.7.7	Verify each pump develops a flow rate ≥ 41.2 gpm at a discharge pressure ≥ 1300 psig.	In accordance with the Inservice Testing Program

Revised SR 3.1.7.7 and the associated Frequency would state:

SR 3.1.7.7	Verify each pump develops a flow rate ≥ 41.2 gpm at a discharge pressure ≥ 1340 psig.	In accordance with the Inservice Testing Program

SR 3.1.7.7, which requires verification of pump flow rate and discharge pressure, would be revised to reflect a higher discharge pressure criterion. The current pressure of 1,300 pounds per square inch gauge (psig) would be changed to 1,340 psig in preparation for implementing an EPU at GGNS. This 40-psig increase remains well below the SLC piping design pressure of 1,700 psig.

Current SR 3.1.7.9 and the associated Frequency state:

SR 3.1.7.9	Verify all heat traced piping between storage tank and pump suction is unblocked.	18 months <u>AND</u> Once within 24 hours after pump suction piping temperature is restored to ≥ 75°F

The current SR 3.1.7.9 would be deleted. New SR 3.1.7.9 and the associated frequency would state:

SR 3.1.7.9	Determine Boron-10 enrichment in atom percent (E).	Once within 24 hours after boron is added to the solution.

SR 3.1.7.9, which required verification of SLC piping heat tracing, would be deleted since boron precipitation is precluded by the maximum concentration limit in SR 3.1.7.5 and the lower temperature limit in SR 3.1.7.2. The licensee proposed a new SR 3.1.7.9, which would require the B-10 enrichment to be determined once within 24 hours after boron is added to the solution.

New SR 3.1.7.10 and the associated Frequency would state:

SR 3.1.7.10	Verify piping between the storage tank and the pump suction is not blocked.	Once within 24 hours after solution temperature is restored to ≥ 45°F

The licensee proposed new SR 3.1.7.10 that would require verifying the piping between the storage tank and the pump suction is not blocked on a frequency of once within 24 hours after the temperature of the SPB solution is restored to greater than or equal to 45 °F.

3.2 Background

By letter dated January 23, 2012, Entergy provided the following description of the SLC system and its components:

> The SLC system consists of an SPB solution storage tank, two positive displacement pumps, two explosive valves (provided in parallel for redundancy), and associated piping and valves used to transfer the SPB solution from the storage tank to the reactor pressure vessel (RPV). The SPB solution is discharged through the High Pressure Core Spray (HPCS) system sparger, which is located in the RPV, to assure adequate mixing.
>
> Implementation of the GGNS Cycle 19 core design results in increased core reactivity, which requires a corresponding increase in negative reactivity to be provided by the SLC system. In order to maintain the desired shutdown margin and current core design flexibilities, the licensee proposes to increase the enrichment of the B-10 isotope dissolved in the SPB solution contained in the SLC storage tank.
>
> Natural boron contains 19.8 atom percent (a/o) of the B-10 isotope. B-10, with its large neutron-absorption capability, is the active neutron absorber component in SPB. Because of this characteristic, the use of the B-10-enriched SPB solution, which will be chemically and physically similar to the current solution, provides a faster negative reactivity insertion rate than the same quantity of SPB with natural boron.

3.3 Revision of TS 3.1.7 Action A and B Conditions and New SR 3.1.7.1

Revised Action A Condition, Required Action A.1, and the associated Completion Time are being revised to reflect that the product of the SPB solution concentration in weight percent (C) and the B-10 enrichment in atom percent (E) in the SPB solution be greater than or equal to 420 or be restored within 8 hours. In addition, a new Action B Condition, Required Action B.1, and the associated Completion Time will require a minimum volume of SPB solution of 4,200 gallons and a revised SR 3.1.7.1 will monitor tank volume once every 24 hours. Currently,

Figure 3.1.7-1 provides an area for operation where the Boron-10 needed to meet ATWS and shutdown margin requirements were met based on volume of available and the percent concentration by weight of the SPB solution. As discussed below, the equation of (C)(E) greater than or equal to 420 and the minimum volume requirements will provide an equivalent LCO to Figure 3.1.7-1.

The SLC system is described in Section 9.3.5 of the GGNS Updated Final Safety Analysis Report (UFSAR). The licensee stated that the SLC system is designed and analyzed to:

- Provide negative reactivity to shut down the reactor in the event of an ATWS,
- Provide the capability of bringing the reactor, at any time in a fuel cycle, from full power and minimum control rod inventory (which is at the peak of the xenon transient) to a subcritical condition with the reactor in the most reactive xenon-free state without taking credit for control rod movement, and
- Buffer the post-accident suppression pool chemistry and prevent iodine re-evolution (i.e., suppression pool pH control) as reflected in the LOCA dose analysis.

The NRC staff's evaluation of the three functions of the SLC system are provided below:

3.3.1 ATWS Requirements

ATWS is defined as an anticipated operational occurrence (AOO) followed by the failure of the reactor trip portion of the protection system specified GDC 20, "Protection system functions," in Appendix A to 10 CFR Part 50. The regulation in 10 CFR 50.62(c)(4) states that each boiling-water reactor must have an SLC system with the capability of injecting into the reactor vessel a borated water solution with reactivity control at least equivalent to the control obtained by injecting 86 gpm of a 13 w/o SPB decahydrate solution at the natural Boron-10 isotope abundance into a 251-inch inside diameter reactor vessel. The SLC system initiation must be automatic (for plants granted a construction permit after July 26, 1984).

In its letter dated January 23, 2012, the licensee prepared the following analysis to demonstrate that the new criteria in Action A will satisfy the 86-gpm equivalency requirement:

> The 86-gpm boron injection equivalency requirement of 10 CFR 50.62 is satisfied by the following relationship:
>
> $$(Q/86) \times (M251/M) \times (C/13) \times (E/19.8) \geq 1$$
>
> Where:
>
> | | |
> |---|---|
> | Q = | Expected SLCS flow rate (gpm) |
> | M251/M = | Mass of water in a 251-inch diameter RPV and recirculation system (lbs [pounds]) divided by the mass of water in the reactor vessel and recirculation system at hot rated condition (lbs) |
> | C = | Sodium pentaborate solution concentration (weight percent) |
> | E = | B-10 isotope enrichment (atom-percent) |
>
> For GGNS, at current licensed thermal power (CLTP):
>
> | | |
> |---|---|
> | Q = | 82.4 gpm (i.e., 41.2 gpm / pump) |
> | M251/M = | 1 (GGNS has a 251-inch diameter reactor vessel) |
> | C = | 3.6% |
> | E = | 19.8% (i.e., natural boron enrichment) |
>
> Therefore, the 86-gpm equivalency requirement for CLTP is satisfied as follows:
>
> $$(Q/86) \times (M251/M) \times (C/13) \times (E/19.8) \geq 1$$
>
> $$(82.4/86) \times (1) \times (13.6/13) \times (19.8/19.8) = 1.0 \geq 1$$
>
> Enriching the B-10 content allows the SPB concentration to be reduced and still significantly increase the SLC system performance margin for the ATWS requirement. No changes are proposed to SLC system flow rate (Q) or to the vessel diameter so that Q = 82.4 gpm and M251/M = 1. Using these values, the above equation may be rewritten as follows:
>
> $$(C)(E) \geq 268.65$$

The NRC staff concludes that the licensee's analysis above demonstrates that any combination of the product of the SPB concentration (C) and the B-10 enrichment (E) that results in a value greater than or equal to 268.65 will satisfy the 86-gpm equivalency requirement. Thus, Action A assures that the proposed change requiring (C)(E) to be greater than or equal to 420 exceeds the 86-gpm equivalency requirement. The NRC staff has reviewed the forgoing analysis and concludes that revised TS 3.1.7 Action A Condition is acceptable as it provides sufficient reactivity control to meet the requirements of 10 CFR 50.62.

3.3.2 Shutdown Requirements

GDC 26 requires a two independent reactivity control systems during normal operation. The SLC system functions as one of these systems and must have an adequate amount of neutron absorber in solution and the capability to inject the solution to bring the reactor to a subcritical condition. The licensee has stated that the new TS 3.1.7 Action A and B Conditions ensure that adequate shutdown margin as stated in the UFSAR is accomplished by injecting a quantity of boron that produces the equivalent of a concentration of at least 660 parts per million (ppm) of natural boron in the reactor core at 68 °F. In addition, the UFSAR states that to allow for potential imperfect mixing and leakage in the reactor system, the solution concentration and enrichment (i.e., natural boron) were selected to produce an in-vessel boron concentration at least 25 percent greater than that for the required shutdown margin, thereby increasing the concentration level from 660 ppm to 825 ppm.

In its letter dated January 23, 2012, the licensee prepared the following analysis to demonstrate that the new criteria of Action A and B will satisfy the 825 ppm B-10 concentration requirement:

> The concentration of natural boron required for 1% shutdown margin for the upcoming Cycle 19 and future fuel cycle changes is greater than the current system design of 660 ppm. A concentration of 780 ppm of natural boron was determined to provide adequate shutdown margin for the expected future fuel and core designs. The system design requirement to maintain the 25% margin above 780 ppm equates to 975 ppm (i.e., 780 ppm × 1.25). Entergy is proposing to make the changes described in Section 2.0 to produce the required equivalent in-vessel boron concentration.
>
> The shutdown margin analysis for Cycle 19, which was analyzed at a boron concentration of 780 ppm of natural boron at 68°F, is 2.94% delta-K. In comparison, the Cycle 18 shutdown margin, which was analyzed at 660 ppm, assuming the current licensing basis (i.e., current licensed thermal power and an 18-month fuel cycle), was 1.12% delta-K.
>
> The planned modification to the SLC system is to include a B-10 enrichment of 96 a/o, which will allow for a SPB concentration (C) of at least 4.4 w/o (420 / 96). The proposed change allows the SPB concentration to be as high as 9.5 w/o, which would enable the use of a B-10 enrichment (E) as low as 44.2 a/o (420 / 9.5).

However, to simplify the calculation, the licensee used the following assumptions: the value of C = 4.2 and E = 100. In its letter dated January 23, 2012, the licensee stated, in part, that

> The B-10 inventory in the SLC storage tank can be calculated using the following formulas:
>
> $m_{SPB} = V \times 0.1337\ ft^3/gal \times \rho(T) \times SG(C) \times (C/100)$
>
> $m_{B\text{-}10} = m_{SPB} \times F_B(E) \times F_{B\text{-}10}(E)$
>
> Where:
>
> | | |
> |---|---|
> | m_{SPB} = | mass of SPB (lbs) |
> | V = | tank volume (gallons) |
> | $\rho(T)$ = | water density as a function of temperature (lbs/ft^3) |
> | SG(C) = | specific gravity as a function of concentration |
> | C = | Concentration (w/o) |
> | $m_{B\text{-}10}$ = | mass of B-10 (lbs) |
> | $F_B(E)$ = | weight fraction of boron element in SPB (function of enrichment) |
> | F_B-10(E) = | weight fraction of B-10 in boron element (function of enrichment) |
>
> For the proposed SLC changes..., the minimum B-10 inventory can be calculated to be 253.4 lbs based on: (i) an SPB concentration of 4.2 w/o with a boron enrichment of 100%; (ii) a tank volume of 4,200 gallons (V); and (iii) a tank temperature of 150°F.
>
> $m_{SPB} = 4{,}200\ gal \times 0.1337\ ft^3/gal \times 61.19\ lbs/ft^3 \times 1.021 \times 4.2/100 = 1{,}473.5\ lbs$
>
> $m_{B\text{-}10} = 1{,}473.5\ lbs \times (0.17197) \times (100\%) = 253.4\ lbs$
>
> Since as much as 138 gallons of the SPB solution may remain in the SLC system piping after the injection terminates, at least 245.06 lbs of B-10 would be injected into the reactor coolant system.

The NRC staff has confirmed that assuming the weight fraction of B-10 in natural boron to be 18.34 w/o, the 245 lbs of B-10 are equivalent to injecting approximately 1,336 lbs (245*100/18.34) of natural boron. In the January 23, 2012, LAR, the licensee stated that the mass of the reactor coolant system at 68 °F is 1.2591 E6 lbs. Based on these numbers, the NRC staff calculated the boron concentration to be 1,061 ppm. Thus, Actions A and B assure that the proposed change requiring (C)(E) to be greater than or equal to 420 with a minimum of 4,200 gallons of SPB solution will exceed the 975-ppm requirement. Based on the NRC staff's review of the forgoing analysis, the NRC staff concludes that TS 3.1.7 Actions A and B Conditions are acceptable as it provides sufficient reactivity control to meet the shutdown margin requirements of GDC 26.

3.3.3 Post-LOCA Suppression Pool pH Control

In its letter dated January 23, 2012, the licensee stated that;

> In addition to controlling reactivity by injecting SPB solution into the reactor pressure vessel, the SLC system SPB solution is used to maintain the suppression pool pH greater than 7.0. During a LOCA, combining irradiated cable jacket material and suppression pool water in the containment/wetwell forms hydrochloric acid (HCl) and nitric acid (HNO_3). These two acids, together with iodine released from the core, lower the pH of suppression pool water over the duration of the accident. Injecting SPB adds a chemical base to the water maintaining a pH greater than 7.0.

SPB dissolves in water, producing boric acid and sodium borate:

Na2 B10016+ 15 H20 -2 Na++ 2 H2BO3+ 8 H3BO3

Since boric acid is a relatively weak acid and sodium hydroxide is a strong base, their solution has a buffering effect and will maintain the pH of the suppression pool water at pH values higher than 7.0. The SPB solution will be well mixed with the suppression pool water by the end of a 24-hour period as a result of reflooding the RPV.

A post-LOCA suppression pool pH analysis was performed considering the impact of the changes to the SLC system due to the EPU. As discussed above, it has been determined that the SLC system will inject at least 1,400 pounds of SPB into the RPV. During the review of the alternate source term LAR, in Amendment No. 145 dated March 14, 2001 (ADAMS Accession No. ML010780172), the NRC approved a methodology to be used for the pH analysis. Using this methodology, assuming 1,400 pounds of SPB, which conservatively models the SLC storage tank solution at minimum volume and minimum concentration, is injected into the RPV, the licensee demonstrated that the suppression pool pH will remain greater than 7.0.

In addition, GGNS has a variety of means of introducing aqueous pH control chemicals from outside sources into the containment in the event they are necessary. GGNS emergency procedures currently contain instructions on how to mix up a batch of SPB in the condensate storage tank with chemicals available in the warehouse and how to inject this solution into the RPV with the HPCS system or the reactor core isolation cooling (RCIC) system. The HPCS and RCIC systems can be aligned to inject this solution directly into the suppression pool for pH control when directed by the emergency procedures. Entergy maintains over 7,000 lbs each of anhydrous borax and boric acid onsite, which produces approximately 11,000 lbs of SPB for use if needed.

As the licensee used a methodology previously approved for pH analyses, the NRC staff concludes that SPB from the SLC system is capable of controlling and maintaining long-term suppression pool water pH levels at 7.0 or above from the first 24 hours through the entire 30-day period of the postulated accident. In addition, the GGNS emergency procedures has instructions that can produce and inject an additional 11,000 pounds of SPB into the

suppression pool which is more than sufficient to maintain pH in the suppression pool greater than 7.0 during and after an accident.

Based on the evaluations in Sections 3.3.1, 3.3.2, and 3.3.3 of this safety evaluation, the NRC staff concludes that revised/new TS 3.1.7 Actions A and B will assure that the SLC system will meet reactivity requirements for shutdown and ATWS and for the pH control of the suppression pool. Because there is only one tank, the proposed Completion Time for Action A is conservatively based on the Action E Completion Time allowed for restoring one SLC subsystem when two SLC subsystems are inoperable. In addition, the proposed Completion Times for Actions B and C are consistent with Action A. Based on the above, the NRC staff concludes that the TS 3.1.7 Actions A and B are acceptable. With the proposed revisions described above, Figure 3.1.7-1 is no longer needed to define the operability of the SLC system and will be deleted. A note will be added to TS page 3.1-23 stating that the next page is 3.1-26. This is an administrative change that allows the current TS page numbering to remain the same and is, therefore, acceptable.

3.4 New TS 3.1.7 Action C Condition

New required Action C is being added to address the SPB solution temperature. The licensee has proposed an operating temperature range for the SPB solution of greater than or equal to 45 °F and less than or equal to 150 °F. The proposed changes are associated with new Action C and SR 3.1.7.2. The licensee stated that the minimum solution temperature (45 °F) provides margin to the SPB saturation temperature and precludes precipitation for SPB solution concentrations that are less than 9.5 w/o. In addition, the licensee stated that the upper temperature limit (150 °F) ensures adequate net positive suction head is available for two-pump operation. The NRC staff has reviewed these limits and concludes that the lower limit will preclude precipitation of the SPB solution and the upper limit will ensure that adequate net positive suction head is available and, therefore, the proposed limits are acceptable.

When proposed Action C is not met, both trains of the SLC subsystems are inoperable as there is only one SLC tank. The proposed Completion Time for Action C of 8 hours is consistent with the proposed completion times for Actions A, B, and E. Action C is similar to Actions A, B, and E because when these Actions are not met, both trains of the SLC subsystems are inoperable. Eight hours is the allowed time for restoring one SLC subsystem when two SLC subsystems are inoperable. If current Action A was not met (resulting in both trains of the SLC subsystem being inoperable, similar to not meeting proposed Action C), the current allowed Completion Time is 72 hours. In addition, the licensee has stated that because of the low probability of an ATWS event, the proposed Completion Time is reasonable and provides adequate time to restore the solution to within the temperature limits. Based on the above, the NRC staff concludes that the proposed 8-hour completion time for Action C is conservative. In addition, when the lower limit must be restored, within 24 hours, the licensee must confirm that the SLC system piping is not blocked due to any precipitation of the SPB from the solution. Based on the above, the NRC staff concludes that new Action C is conservative when compared to the current TS requirements and will assure that the SLC system will be able to provide sufficient reactivity control to meet the shutdown margin, ATWS, and pH control requirements and is, therefore, acceptable.

3.5 Renumbering of Existing TS 3.1.7 Action B, C, and D Conditions

The following changes were made due the addition on Action B and C Conditions:

- Existing Action B and Required Action B.1 are being renumbered as Action D and Required Action D.1, respectively.
- Existing Action C and Required Action C.1 are being renumbered as Action E and Required Action E.1, respectively.
- Existing Action D and Required Action D.1 are being renumbered as Action F and Required Action F.1, respectively.

These changes are administrative in nature and the NRC staff concludes they are acceptable.

3.6 Revision of TS 3.1.7 Action D and E Conditions

Renumbered Action D and E Conditions are being revised to clarify that they are applicable only when subsystems are inoperable for reasons other than Conditions A, B, or C as Conditions A, B, and C have specific criteria for inoperability and have Required Action and Completion Times more restrictive than Conditions D and E. The NRC staff concludes that this change is more conservative than the current TS and is, therefore, acceptable. In addition, this TS change is consistent with the Standard Technical Specifications for the SLC system.

3.7 Revision of SR 3.1.7.1

SR 3.1.7.1 is being revised to verify the available volume of the SPB solution is greater than or equal to 4,200 gallons. This SR verifies the requirement in Action B and is an assumption used in the determination of the acceptance criteria for Action A. The calculation of the B-10 injected into the RPV is based on the availability of a minimum of 4,200 gallons of SPB as discussed in Sections 3.3 and 3.3.2 of this safety evaluation and is, therefore, acceptable. As discussed in Section 3.3 of this safety evaluation regarding the proposed changes to TS 3.1.7, the NRC staff concludes that Figure 3.1.7-1 is no longer needed to define the operability of the SLC system and will be deleted.

3.8 Revision of SR 3.1.7.2

SR 3.1.7.2 is being revised to verify the temperature of the SPB solution is greater than or equal to 45°F and less than or equal to 150°F. This SR verifies the requirements in Action C as discussed in Section 3.3. The NRC staff concludes that temperature limits will assure the operability of the SLC system to assure that the SLC system will be able to provide sufficient reactivity control to meet the shutdown margin, ATWS, and pH control requirements and, therefore, is acceptable. The NRC staff concludes that with this change, Figure 3.1.7-2 is no longer needed to define the operability of the SLC system and will be deleted.

3.9 Addition of Note to TS Page 3.1-23 to Denote Deleted TS Pages 3.1-24 and 3.1-25

As Figures 3.1.7-1 and 3.1.7-2 will be deleted (see Section 3.15 of this safety evaluation), a note will be added to TS page 3.1-23 stating that the next page is 3.1-26. The NRC staff concludes that this is an administrative change that allows the current TS page numbering to remain the same and is, therefore, acceptable.

3.10 Revision of SR 3.1.7.3

SR 3.1.7.3, which currently requires verification of the temperature of the pump suction piping, is being deleted. Verification of pump suction piping temperature will be performed as part of the proposed SR 3.1.7.2, as described in the TS Bases markup. A new SR 3.1.7.3 is proposed that requires verification that the product (C)(E) is greater than or equal to 420. A new note is being added to address the association of SRs 3.1.7.5 and 3.1.7.9 to this SR. The proposed Frequency is 31 days and is consistent with the Frequency of SR 3.1.7.5, which requires verification of the concentration of the SPB solution. The NRC staff concludes that the deletion of the current SR 3.1.7.3 is acceptable as it being performed as part of SR 3.1.7.2. The new SR to verify the product of (C)(E) is also dependent on SR 3.1.7.3 for the determination of (E), which is one of the required values in this equation. The value of (E) is only required to be confirmed when boron is added to the storage tank, since the B-10 enrichment cannot be changed by any other processes. Based on the NRC staff's review and approval of the new TS Action A (Sections 3.3.1, 3.3.2 and 3.3.3 of this safety evaluation), the NRC staff concludes that this new SR assures that Action A is met and will confirm that the SLC system will be able to provide sufficient reactivity control to meet the shutdown margin, ATWS, and pH control requirements and is, therefore, acceptable.

3.11 Revision of SR 3.1.7.5

SR 3.1.7.5 is being revised to verify the concentration of SPB solution is less than or equal to 9.5 weight percent (w/o). The temperature listed in the Frequency associated with performing the SR any time the solution low temperature is restored to within limits is being revised to greater than or equal to 45 °F. The licensee stated that the minimum solution temperature (45 °F) provides margin to the SPB saturation temperature and precludes precipitation for SPB solution concentrations that are less than 9.5 w/o. The planned modification to the SLC system is to include a B-10 enrichment (E) of 96 a/o, which will allow for a SPB concentration (C) of at least 4.4 w/o (420 / 96). The proposed change allows the SPB concentration to be as high as 9.5 w/o, which would enable the use of a B-10 enrichment (E) as low as 44.2 a/o (420 / 9.5). The change in temperature is consistent with the proposed operating temperature band. The NRC staff has confirmed that there is margin to preclude precipitation of the SPB from the solution and that the SPB concentration will provide margin to the required B-10 in solution and is, therefore, acceptable. In addition, this SR is consistent with the STS.

3.12 Revision of SR 3.1.7.7

SR 3.1.7.7, which requires verification of pump flow rate and discharge pressure, is being revised to reflect a higher discharge pressure criterion. The current pressure of 1,300 psig will be changed to 1,340 psig in preparation for implementing an EPU at GGNS. This 40-psig increase remains well below the SLC piping design pressure of 1,700 psig. The test confirms

one point on the pump design curve and confirms operability. The NRC staff concludes that this change is conservative and is, therefore, acceptable.

3.13 Revision of SR 3.1.7.9

SR 3.1.7.9, which required verification of SLC piping heat tracing, is being deleted since boron precipitation is precluded by the maximum concentration limit in SR 3.1.7.5 and the lower temperature limit in SR 3.1.7.2. The purpose of the SLC storage tank operating heater and piping heat tracing is to ensure the solution in the SLC storage tank and piping stays above the precipitation temperature. As a result of increasing the enrichment of the B-10 isotope, the concentration of the SPB solution will be reduced to a value such that the precipitation temperature of the highly enriched B-10 solution is below that of the ambient temperature in the area, which ranges from 60 °F to 105 °F, with an average of 90 °F. Specifically, the proposed minimum solution temperature (45 °F) provides margin to the saturation temperature (40 °F) corresponding to the SPB concentration at 9.5 w/o and precludes precipitation for SPB solution concentrations that are less than 9.5 w/o. Therefore, the SLC system will still be able to inject the required amount of solution without the tank operating heater and the heat tracing on the piping. Based on the above, the NRC staff concludes that the heat tracing requirement for current SR 3.1.7.9 can be deleted. However, the NRC staff has requested that the verification for the determination of the potential for blockage of the piping between the storage tank and pump suction be maintained. The licensee has agreed and maintained this SR requirement in new SR 3.1.7.10.

A new SR 3.1.7.9 is proposed, which requires the B-10 enrichment (E) to be determined once within 24 hours after boron is added to the solution. As noted above, this SR will confirm the value of (E), which is needed for the determination for the compliance with Condition A. After the initial addition of SPB to the tank, while the concentration of the SPB may vary, the B-10 enrichment will not change. The enrichment will only change if new SPB is added with a different B-10 enrichment. However, the SR will require that (E) be re-determined within 24 hours after the SPB is added to the tank. Based on the review above, the NRC staff concludes that this new SR is needed to meet Condition A and is, therefore, acceptable.

3.14 Addition of New SR 3.1.7.10

By letter dated March 21, 2012, the licensee proposed the addition of new SR 3.1.7.10, which is consistent with current SR 3.1.7.9 except for the deletion of the wording "all heat traced piping" from the SR. This SR will verify within 24 hours that the piping between the storage tank and pump suction is unblocked whenever the temperature of the SPB solution falls below 45 °F. This SR was maintained to assure that if any SPB precipitated out of the solution, that it does not block the piping. The basis for removing the wording "all heat traced piping" from this SR is discussed in Section 3.13 of this safety evaluation. The NRC staff concludes that this SR will assure the flow path from the storage tank to the RV and is, therefore, acceptable.

3.15 Deletion of Figures 3.1.7-1 and 3.1.7-2

With the proposed revisions described above, Figures 3.1.7-1 and 3.1.7-2 are no longer needed and are proposed for deletion. A note will be added to TS page 3.1-23 stating that the next page is 3.1-26. This is an administrative change that allows the current TS page numbering to

remain the same. Based on the above, the NRC staff concludes that Figures 3.1.7-1 and 3.1.7-2 can be deleted and the note to reflect the deletion of the pages is administrative in nature, and is, therefore, acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Mississippi 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 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 February 7, 2012 (77 FR 6148). 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) 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: A. Wang

Date: May 11, 2012

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

Sincerely,

/RA/

Alan Wang, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosures:
1. Amendment No. 190 to NPF-29
2. Safety Evaluation

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