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

March 25, 2010

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: CHANGE TO THE MINIMUM CRITICAL POWER RATIO SAFETY LIMIT (TAC NO. ME2474)

Dear Sir or Madam:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 184 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 October 27, 2009.

The amendment revises TS Section 2.1.1, "Reactor Core SLs [Safety Limits]," Subsection 2.1.1.2, to change the two recirculation loop safety limit for minimum critical power ratio (SLMCPR) from 1.08 to 1.09 and the single recirculation loop SLMCPR from 1.10 to 1.12. The changes to the TSs are necessary as a result of the GGNS Cycle 18 cycle-specific SLMCPR calculations.

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,

Balwant K. Singal for

Carl F. Lyon, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosures:
1. Amendment No. 184 to NPF-29
2. Safety Evaluation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
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. 184
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 October 27, 2009, 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. 184 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 after the current cycle (Cycle 17) is completed and prior to the operation of Cycle 18.

FOR THE NUCLEAR REGULATORY COMMISSION

James R. Hall for

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: March 25, 2010

ATTACHMENT TO LICENSE AMENDMENT NO. 184

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
2.0-1	2.0-1

(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. 184 are hereby incorporated into this license. Entergy Operations, Inc. shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

The Surveillance Requirements (SRs) for Diesel Generator 12 contained in the Technical Specifications and listed below, are not required to be performed immediately upon implementation of Amendment No. 169. The SRs listed below shall be successfully demonstrated at the next regularly scheduled performance.

SR 3.8.1.9,
SR 3.8.1.10, and
SR 3.8.1.14

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10% rated core flow:

THERMAL POWER shall be ≤ 25% RTP.

2.1.1.2 With the reactor steam dome pressure ≥ 785 psig and core flow ≥ 10% rated core flow:

MCPR shall be ≥ 1.09 for two recirculation loop operation or ≥ 1.12 for single recirculation loop operation.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be ≤ 1325 psig.

2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

2.2.2 Insert all insertable control rods.

(continued)

UNITED STATES
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 184 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 October 27, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML093140503), Entergy Operations, Inc. (the licensee), requested changes to the Technical Specifications (TSs) for Grand Gulf Nuclear Station, Unit 1 (GGNS).

The proposed changes would revise TS Section 2.1.1, "Reactor Core SLs [Safety Limits]," Subsection 2.1.1.2, to change the two recirculation loop (TLO) safety limit for minimum critical power ratio (SLMCPR) from 1.08 to 1.09 and the single recirculation loop (SLO) SLMCPR from 1.10 to 1.12. The changes to the TSs are necessary as a result of the GGNS Cycle 18 cycle-specific SLMCPR calculations.

2.0 REGULATORY EVALUATION

The regulations in Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.36, "Technical specifications," state that the safety limits (SLs) for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain physical barriers that guard against the uncontrolled release of radioactivity. The SLMCPR is an SL that is required to be in the TSs to ensure that fuel design limits are not exceeded. The GGNS TS 2.1.1.2 contains the unit SLMCPRs, which can vary from cycle to cycle. The U.S. Nuclear Regulatory Commission (NRC) approved methodology, contained in a Global Nuclear Fuels-Americas, LLC (GNF) proprietary Licensing Topical Report (LTR), GESTAR II, NEDE-24011-P-A, "General Electric Standard Application for Reload Fuel," Amendment 22*, is used to determine the cycle-specific limit to be listed in TS 2.1.1.2.

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* Thadani, A. C., U.S. Nuclear Regulatory Commission, Letter and Safety Evaluation to J. S. Charnley, General Electric Company, Acceptance for Referencing of Amendment 22 to General Electric Licensing Topical Report NEDE–24011–P–A, "General Electric Standard Application for Reactor Fuel" (TAC No. 71444), dated July 23, 1990 (not publicly available).

Appendix A to 10 CFR Part 50, General Design Criterion (GDC) 10, "Reactor design," states "[t]he reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences."

NUREG-0800, "Standard Review Plan for the Review of Safety Analyses Reports for Nuclear Power Plants," Section 4.4, "Thermal and Hydraulic Design," states that the critical power ratio (CPR) is to be established such that at least 99.9 percent of fuel rods in the core would not be expected to experience departure from nucleate boiling or boiling transition during normal operation or anticipated operational occurrences.

3.0 TECHNICAL EVALUATION

3.1 Proposed Changes

Currently, the license TS Section 2.1.1.2 reads as follows:

> With the reactor steam dome pressure ≥ 785 psig [pounds per square inch gauge] and core flow ≥ 10% rated core flow:
>
> MCPR shall be ≥ 1.08 for two recirculation loop operation or ≥ 1.10 for single recirculation loop operation.

On the basis of the calculations for GGNS core reload analysis for Operating Cycle 18, the calculated SLMCPR increases from 1.08 to 1.09 for TLO and from 1.10 to 1.12 for SLO. Accordingly, GGNS TS Section 2.1.1.2 is revised to read as follows:

> With the reactor steam dome pressure ≥ 785 psig and core flow ≥ 10% rated core flow:
>
> MCPR shall be ≥ 1.09 for two recirculation loop operation or ≥ 1.12 for single recirculation loop operation.

3.2 NRC Staff Evaluation

As stated earlier, the SLMCPR numeric values in GGNS TS 2.1.1.2 are SLs. The SLMCPR limit is established such that at least 99.9 percent of the fuel rods in the core would not be expected to experience the onset of transition boiling as a result of normal operation and transients, which in turn ensures fuel cladding damage does not occur. The SLMCPR limit is established such that fuel design limits are not exceeded during steady state operation, normal operational transients, and abnormal operational transients. As such, fuel damage is calculated not to occur, if the limit is not violated. However, because fuel damage is not directly observable, a step-back approach is used to establish corresponding MCPR operating limits. The Operating Limit MCPR (OLMCPR) is established by summing the cycle-specific core reload transient analyses adders and the calculated SLMCPR values. The OLMCPR are required to be established and documented in the Core Operating Limits Report (COLR) for each reload cycle by GGNS TS 5.6.5, "Core Operating Limits Report (COLR)."

The absolute value of SLMCPR tends to vary from cycle to cycle, typically due to the introduction of improved fuel bundle types, changes in fuel vendors, and changes in core loading pattern. Following the determination of the cycle-specific SLMCPR values, the OLMCPR values are derived. The cycle-specific SLMCPR numeric values are listed in GGNS TS 2.1.1.2 and, therefore, must be revised using the license amendment process.

GNF performed the GGNS Cycle 18 SLMCPR calculation consistent with NRC-approved methodologies and uncertainties, as documented in LTRs NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel," Revision 16 (GESTARII) and NEDC-33383-P, "GEXL97 Correlation Applicable to ATRIUM-10 Fuel," Revision 1, June 2008, and the following LTRs:

- NEDC-32601P-A, "Methodology and Uncertainties for Safety Limit MCPR Evaluations," August 1999.
- NEDC-32694P-A, "Power Distribution Uncertainties for Safety Limit MCPR Evaluations," August 1999.
- NEDC-32505P-A, "R-Factor Calculation Method for GE11, GE12 and GE13 Fuel," Revision 1, July 1999.
- NEDE-10958-PA,"General Electric BWR Thermal Analysis Basis (GETAB): Data, Correlation and Design Application," January 1977.

By letter dated August 29, 2008, GNF submitted to the NRC a report titled, "GNF2 Advantage Generic Compliance with NEDE-24011-P-A (GESTAR II), NEDC-333270P, Revision 1." This NRC-approved report provides generic information relative to the GNF2 fuel design and analysis applicable to boiling-water reactors (BWRs).

On the basis of the analysis performed by GNF, the licensee has proposed to amend the GGNS TS 2.1.1.2 to revise the SLMCPR for the Operating Cycle 18. GGNS's Cycle 18 is the first cycle of operation with GNF2 reload fuel. The Cycle 18 core design consists of 308 fresh GNF2 bundles, 244 reload ATRIUM-10 bundles, and 248 reload GE14 bundles.

The current required SLMCPR values in GGNS TS 2.1.1 is 1.08 for TLO and 1.10 for SLO. Calculations performed by GNF for Cycle 18 resulted in a minimum calculated value of SLMCPR to be 1.09 for TLO and 1.12 for SLO. For Cycle 18, the limiting SLMCPR occurs at the rated core flow condition. GNF's calculation of the revised plant-specific SLMCPR numeric values for GGNS Cycle 18 was performed as part of the reload licensing analysis for GGNS Cycle 18 and is based upon NRC-approved methods, and therefore it is acceptable.

In consideration of the information submitted by the licensee in support of the proposed license amendment, the NRC staff concludes that the licensee's proposed amendment to update the TS to include cycle-specific SLMCPR numeric values is consistent with the regulatory requirements. The NRC staff determined that the applicable regulations and requirements continue to be met, and that the analysis performed to calculate the GGNS Cycle 18 SLMCPR numeric values were based upon NRC-approved methodologies. The NRC staff also determined that the proposed changes do not require any exemptions or relief from regulatory

requirements, other than the TS change. Applicable regulatory requirements of 10 CFR 50.36 will continue to be met, adequate defense-in-depth will be maintained, and sufficient safety margins will be maintained. Therefore, the NRC staff concludes that the license amendment request meets the requirements of 10 CFR 50.36 and GDC 10 and is acceptable. The licensee is authorized to change the SLMCPR in TS 2.1.1.2 from 1.08 to 1.09 for two-loop recirculation, and from 1.10 to 1.12 for single-loop recirculation, at steam dome pressures greater than 785 psig and at core flows greater than 10 percent of rated core flow.

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 January 5, 2010 (75 FR 461). Accordingly, the amendments meet 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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: M. M. Razzaque

Date: March 25, 2010

March 25, 2010

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: CHANGE TO THE MINIMUM CRITICAL POWER RATIO SAFETY LIMIT (TAC NO. ME2474)

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Sincerely,
/RA by Balwant K. Singal for/

Carl F. Lyon, Project Manager
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Docket No. 50-416

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