



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

April 20, 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: REVISE TS SECTION 2.1.1.2 REACTOR CORE SAFETY LIMIT MINIMUM
CRITICAL POWER RATIO (TAC NO. ME7531)

Dear Sir or Madam:

The U.S. Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 189 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 28, 2011, as supplemented by letter dated January 26, 2012.

The amendment increases the numeric values of the Safety Limit Minimum Critical Power Ratio in TS Section 2.1.1.2 from 1.09 to 1.11 for two recirculation loop operation (TLO) and from 1.12 to 1.14 for single recirculation loop operation (SLO). The Minimum Critical Power Ratio Safety Limit values for both TLO and SLO are determined in accordance with the requirements set forth in NRC-approved General Electric Company (GE) licensing topical report NEDC-33173P, "Applicability of GE Methods to Expanded Operating Domains," Revision 0, February 2006.

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,

A handwritten signature in cursive script that reads "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. 189 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. 189
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 28, 2011, as supplemented by letter dated January 26, 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.

Enclosure 1

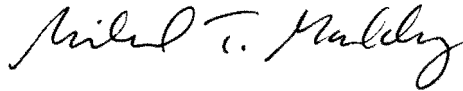
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Facility Operating License No. NPF-29 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 189 are hereby incorporated into this 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 issuance.

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: April 20, 2012

ATTACHMENT TO LICENSE AMENDMENT NO. 189

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. 189 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.

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 $\leq$ 25% RTP.

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

MCPR shall be $\geq$ 1.11 for two recirculation loop operation or $\geq$ 1.14 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 $\leq$ 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. 189 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 28, 2011, as supplemented by letter dated January 26, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML113060150 and ML120310289, respectively), Entergy Operations, Inc. (Entergy, the licensee), requested changes to the Technical Specifications (TSs) for Grand Gulf Nuclear Station, Unit 1 (GGNS). Portions of the letters dated October 28, 2011, and January 26, 2012, contained sensitive unclassified non-safeguards information (proprietary) and, accordingly, those portions have been withheld from public disclosure.

The supplemental letter dated January 26, 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 14, 2012 (77 FR 8291).

The amendment would increase the numeric values of the Safety Limit Minimum Critical Power Ratio (SLMCPR) in TS Section 2.1.1.2 from 1.09 to 1.11 for two recirculation loop operation (TLO) and from 1.12 to 1.14 for single recirculation loop operation (SLO). The Minimum Critical Power Ratio (MCPR) Safety Limit (SL) values for both TLO and SLO are determined in accordance with the requirements set forth in NRC-approved General Electric Company (GE) Licensing Topical Report (LTR) NEDC-33173P, "Applicability of GE Methods to Expanded Operating Domains," Revision 0, February 2006.

2.0 REGULATORY EVALUATION

In Section 50.36, "Technical specifications," of Title 10 of the *Code of Federal Regulations* (10 CFR), the NRC established its regulatory requirements related to the content of TSs. Pursuant to 10 CFR 50.36(c), 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; (3) surveillance requirements; (4) design features; and (5) administrative controls.

The regulations in 10 CFR 50.36(c)(1)(i)(A) state, in part, that

Safety limits for nuclear reactors are limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain of the physical barriers that guard against the uncontrolled release of radioactivity.

The SLMCPR is a safety limit (SL) that is required to be in the TSs to ensure that fuel design limits are not exceeded. GGNS TS 2.1.1.2 contains the unit SLMCPR limit, which can vary from cycle to cycle. The NRC-approved methodology, contained in a Global Nuclear Fuels-Americas, LLC (GNF) proprietary LTR GESTAR II, NEDE-24011-P-A, "General Electric Standard Application for Reload Fuel," Amendment 22*, as referenced in GGNS TS 5.6.5, "Core Operating Limits Report (COLR)," is used to determine the cycle-specific limit to be listed in TS 2.1.1.2.

Appendix A to 10 CFR Part 50, General Design Criterion (GDC) 10, "Reactor design," states that "[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 Analysis Reports for Nuclear Power Plants: LWR Edition," 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.

The information submitted by the licensee in support of the proposed license amendment request is consistent with the regulatory requirements.

* 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).

3.0 TECHNICAL EVALUATION

3.1 Proposed TS Changes

From the GGNS core reload analysis for Operating Cycle 19, Entergy has determined that the calculated SLMCPR increases from 1.09 to 1.11 for TLO and SLMCPR increases from 1.12 to 1.14 for SLO. Currently, TS 2.1.1.2 states,

With the reactor steam dome pressure $\geq$ 785 psig and core flow $\geq$ 10% rated core flow:

MCPR shall be $\geq$ 1.09 for two recirculation loop operation or $\geq$ 1.12 for single recirculation loop operation.

Revised TS 2.1.1.2 would state,

With the reactor steam dome pressure $\geq$ 785 psig and core flow $\geq$ 10% rated core flow:

MCPR shall be $\geq$ 1.11 for two recirculation loop operation or $\geq$ 1.14 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% 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 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 19 SLMCPR calculation consistent with NRC-approved methodologies and uncertainties, as documented in proprietary LTR NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel," Revision 18 (GESTARII) and the following proprietary 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.

NEDC-32505P-A is the generic R-Factor methodology report that describes the changed methodology that was adopted after part-length rods were introduced. The NRC staff's safety evaluation for NEDC-32505P-A has a requirement that the applicability of the R-Factor methodology is confirmed when a new fuel type is introduced. The Cycle 19 core (first extended power uprate (EPU) cycle) will be comprised mostly of GNF2 fuel and remaining GE14 legacy fuel (at least twice burned). The confirmation for GE14 is contained in proprietary report "GEXL14 Correlation for GE14 Fuel, NEDC-32851P Revision 2, and GEXL 10 Correlation for GE 12 Fuel with Inconel Spacer, NEDC-32464P Revision 2," transmitted by GNF letter FLN-2001-018, dated September 25, 2001 (ADAMS Accession No. ML012760516); and in the proprietary "Confirmation of the Applicability of the GEXL14 Correlation and Associated R-Factor Methodology for Calculating SLMCPR Values in Cores Containing GE14 Fuel," transmitted by GNF letter FLN-2001-017, dated October 1, 2001 (nonpublic). The confirmation for GNF2 is contained in "GNF2 Advantage Generic Compliance with NEDE-24011-P-A (GESTAR II), NEDC-33270P, March 2007, and GEXL17 Correlation for GNF2 Fuel, NEDC-33292P, March 2007," transmitted by GNF letter FLN-2007-011, dated March 14, 2007 (ADAMS Accession No. ML070780335).

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 19. This information regarding requested changes to the TS SLMCPR is based on and is for the GGNS EPU license condition of 4,408 megawatts thermal (MWt) in Cycle 19. The EPU condition represents a 13 percent increase in power relative to the 3,898 MWt licensed power of Cycle 18. Also addressed is the application of the limitations from the NRC staff's safety evaluation for the Interim Methods Licensing Topical Report (IMLTR), "Applicability of GE Methods to Expanded Operating Domains," NEDC-33173P-A, Revision 1, September 2010, related to EPUs. Specifically, the following limitation is being addressed:

- For EPU operation, a 0.02 value shall be added to the cycle-specific SLMCPR value. This adder is applicable to SLO, which is derived from the dual loop SLMCPR value.

The Cycle 19 core (first EPU cycle) will be comprised mostly of GNF2 fuel and remaining GE14 legacy fuel (at least twice burned). 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-33270P, Revision 1." This NRC-approved report provides generic information relative to the GNF2 fuel design and analysis applicable to boiling-water reactors (BWRs).

On page 7 of Attachment 3 of the license amendment request dated October 28, 2011, the licensee stated that a manufacturing defect was discovered in the spacer flow wings of the fresh GNF2 fuel loaded in GGNS Cycle 18. The condition was characterized as the spacer flow wing associated with a corner location being bent downward. The manufacturing process leading to this condition has been corrected such that the GGNS Cycle 19 GNF2 bundles are not affected by this defect. However, as the Cycle 18 GNF2 fuel continues to reside in Cycle 19, the effect of this defect on the SLMCPR was assessed by the licensee.

The method used by the licensee for evaluation of the effect on the defect was the same as that reviewed in an audit by the NRC staff on August 20, 2010, associated with the James A. FitzPatrick Nuclear Power Plant (FitzPatrick) Cycle 20 SLMCPR TS change request. The NRC staff acknowledged this audit in the safety evaluation report dated September 27, 2010 (ADAMS Accession No. ML102460401), for the FitzPatrick submittal, and accepted this evaluation method for assessing the effect of the GNF2 bent spacer wing.

By letter dated January 26, 2012, in response to the NRC staff's request for additional information dated January 4, 2012 (ADAMS Accession No. ML120040501), concerning the applicability of the FitzPatrick evaluation method to GGNS, the licensee stated that the number of potentially affected GNF2 fuel bundles in the GGNS Cycle 19 core, and thus the total number of corner rods potentially affected by the bent spacer wing defect, was higher than in the FitzPatrick Cycle 20 core. However, the number of potentially affected corner rods per fuel bundle is the same for both GGNS and FitzPatrick. This was because the manufacturing process which created this defect was the same for both these fuel reloads. The licensee stated how the evaluation method applied to FitzPatrick was applicable to GGNS because it applies the defect rate on a percentage basis. The evaluation method described in the FitzPatrick documentation was a generalized method for assessment of the effect of bent spacer wings in corner locations. Plant-/cycle-specific application of the evaluation method utilizes appropriate plant-/cycle-specific conditions and appropriate assessments of the number of potential bent spacer wing defects in that plant/cycle. On the basis of the licensee's explanation, as summarized above, the NRC staff agrees with the licensee that the FitzPatrick evaluation method is applicable to the GGNS Cycle 19.

The current required SLMCPR values in GGNS TS 2.1.1.2 is 1.09 for TLO and 1.12 for SLO. Calculations performed by GNF for Cycle 19 resulted in a minimum calculated value of SLMCPR to be 1.11 for TLO, and 1.14 for SLO. For Cycle 19, the minimum core flow SLMCPR calculation performed at 92.8 percent core flow and rated core power condition was limiting as compared to the rated core flow and rated core power condition. GNF's calculation of the revised plant-specific SLMCPR numeric values for GGNS Cycle 19 was performed as part of the reload licensing analysis for GGNS Cycle 19 and is based upon NRC-approved methods and, therefore, is acceptable.

In consideration of the information submitted by the licensee in support of the proposed license amendment, as summarized in this safety evaluation, the NRC staff concludes that the licensee's proposed amendment to update the TS to include cycle-specific SLMCPR numeric values are based on the NRC-approved methodologies and is consistent with the regulatory

requirements as discussed in Section 2.0 of this safety evaluation, and therefore, is acceptable. The licensee is authorized to change the SLMCPR as existing in TS 2.1.1.2 from 1.09 to 1.11 for dual-loop recirculation, and from 1.12 to 1.14 for single-loop recirculation, at steam dome pressures greater than or equal to 785 pounds per square inch gauge and at core flows greater than or equal to 10 percent of rated core flow.

The proposed license amendment request was evaluated by the NRC staff to determine whether applicable regulations and requirements continue to be met, and that the analysis performed to calculate the GGNS Cycle 19 SLMCPR numeric values were based upon NRC approved methodologies. Applicable regulatory requirements will continue to be met, adequate defense-in-depth will be maintained, and sufficient safety margins will be maintained. The NRC staff concludes that GDC 10 is met and therefore, concludes that this license amendment request is 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 14, 2012 (77 FR 8291). 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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: M. Razzaque

Date: April 20, 2012

April 20, 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
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CRITICAL POWER RATIO (TAC NO. ME7531)

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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. 189 to NPF-29
2. Safety Evaluation

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