October 24, 2007

Mr. William R. Brian
Site Vice President
Grand Gulf Nuclear Station
Entergy Operations, Inc.
P.O. Box 756
Port Gibson, MS 39150

SUBJECT: GRAND GULF NUCLEAR STATION, UNIT 1 - ISSUANCE OF AMENDMENT RE: CHANGES TO TECHNICAL SPECIFICATIONS SURVEILLANCE REQUIREMENT 3.3.1.1.7, THE LOCAL POWER RANGE MONITOR CALIBRATION FREQUENCY (TAC NO. MD3469)

Dear Mr. Brian:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 177 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 November 1, 2006, as supplemented by letters dated November 22, 2006, April 4, May 7, August 16, and September 21, 2007.

The amendment revised the GGNS TS Surveillance Requirement 3.3.1.1.7 for the surveillance interval of the local power range monitor calibrations from 1000 megawatt-days per ton (MWD/T) (approximately every 36 days) to 2000 MWD/T (approximately every 72 days).

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/

Bhalchandra Vaidya, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosures: 1. Amendment No. 177 to NPF-29
2. Safety Evaluation

cc w/encls: See next page

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See previous concurrence

OFFICE	NRR/LPL4/PM	NRR/LPL4/LA	NRR/SRXB/BC	NRR/EIC/BC	OGC - NLO	NRR/LPL4/BC
NAME	BVaidya	JBurkhardt	GCranston*	WKemper:HCGarg for*	AHodgdon*	THiltz:MMarkley for*
DATE	10/24/07	10/24/07	10/5/07	10/9/07	10/19/07	10/23/07

OFFICIAL RECORD COPY

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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. 177
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 November 1, 2006, as supplemented by letters dated November 22, 2006, April 4, May 7, August 16, and September 21, 2007, 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 the 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. 177 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 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Thomas G. Hiltz, 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: October 24, 2007

ATTACHMENT TO LICENSE AMENDMENT NO. 177

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
3.3-4	3.3-4

(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. 177 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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 177 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 November 1, 2006 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML063130370) (Reference 1), as supplemented by letters dated November 22, 2006, April 4, May 7, August 16, and September 21, 2007 (ADAMS Accession Nos. ML063260567, ML070950059, ML071280500, ML072610503, and ML072740191, respectively), Entergy Operations, Inc., et al. (the licensee), requested changes to the Technical Specifications (TSs) for Grand Gulf Nuclear Station, Unit 1 (GGNS). The supplements dated November 22, 2006, April 4, May 7, August 16, and September 21, 2007, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on December 5, 2006 (71 FR 70559).

The proposed change would revise the GGNS TS Surveillance Requirement (SR) 3.3.1.1.7 for the surveillance interval of the local power range monitor (LPRM) calibrations from 1000 megawatt-days per ton (MWD/T) (approximately every 36 days) to 2000 MWD/T (approximately every 72 days). The ton (T) unit of weight is expressed in terms of metric tons of fuel residing in the reactor core.

2.0 REGULATORY EVALUATION

2.1 Background

The LPRMs are part of the neutron monitoring system. The neutron monitoring system is a system of in-core neutron detectors and out-of-core electronic monitoring equipment. The system provides indication of neutron flux, which can be correlated to thermal power levels for the entire range of flux conditions that exist in the core. The neutron monitoring system provides input to the Rod Control and Information System to initiate rod blocks if preset flux limits are exceeded, and input to the Reactor Protection System to initiate a scram if other limits are exceeded. Input from the neutron monitor system to the process computer is used to calculate core thermal limits and ensure operations are within established limits.

The GGNS LPRM system consists of 44 LPRM string assemblies, each containing four miniature fission chamber type neutron detectors. All detectors are positioned at various locations on four horizontal planes in the reactor core. LPRMs are calibrated periodically because of depletion of the fissile detection material in the fission chambers. Through a calibration process, instrument uncertainties in the measurement of core operating parameters may be minimized. Each LPRM assembly contains a calibration tube for a Traversing Incore Probe (TIP). The TIP system provides a signal proportional to the gamma flux, which correlates to the neutron flux at LPRM locations. This high-precision flux signal is collected by the plant computer system. The collected TIP data is compared to the LPRM reading and each gain adjustment factor for LPRM is calculated.

2.2 Discussion

The NRC staff finds that the licensee, in Section 5.0 of Attachment 1 to its application dated November 1, 2006, identified the applicable regulatory requirements. The review and the basis for staff acceptance included the requirements of 10 CFR Part 50, Appendix A, General Design Criteria (GDC) 26, 28, and 29;10 CFR 50.90; and 10 CFR 50.92 for no significant hazards consideration and TSs.

GDCs 26, 28, and 29 require reactivity to be controllable such that fuel design limits are not exceeded during normal operation and anticipated operational occurrences. The change to the LPRM calibration interval does not adversely affect the current thermal limit analysis nor adversely affect the ability to control reactivity within fuel design limits.

The GGNS Updated Final Safety Analysis Report provides details of the LPRM, Average Power Range Monitor (APRM), Rod Block Monitor (RBM), and TIP systems in Section 7.6.1.5, including the design requirements. The APRM and RBM systems are the only nuclear instrumentation systems that use the calibrated LPRM readings.

The staff also utilized the results and conclusions of the current safety limit minimum critical power ratio (SLMCPR) analysis for GGNS (Reference 2) using approved AREVA NP methods (Reference 3), with respect to maintaining the power distribution uncertainties assumed in the analysis, for the review and the basis of acceptance.

In its application dated November 1, 2006, the licensee cited precedents of James A. Fitzpatrick Nuclear Power Plant, dated May 1 2003 (Reference 7), Vermont Yankee Nuclear Power Station, dated July 18, 2000 (Reference 8) and River Bend Station, Unit 1, dated June 11, 1999 (Reference 9). However, the NRC staff approved these amendment requests only after reviewing the plant-specific information.

3.0 TECHNICAL EVALUATION

3.1 Evaluation

The licensee requested a change to the GGNS TS SR 3.3.1.1.7 to increase the whole core LPRM calibrations interval from 1000 MWD/T to 2000 MWD/T. In its application dated November 1, 2006 (Reference 1), the licensee presented its analysis of the proposed TS change, which is summarized below:

- The current SR was originally based on using the P-1 core monitoring system and older design LPRM detector, which experienced drift between calibrations. GGNS currently uses an improved AREVA NP POWERPLEX-III core monitoring system and newer LPRM chambers (NA250 series) which exhibit more consistent sensitivity than older LPRM detectors.

- The uncertainty in the power distribution will remain within the value used in the GGNS minimum critical power ratio (MCPR) safety limit analysis for Cycle 12 operation, dated April 2001 (Reference 2).

- The basis for the extension of the calibration period is that the increase in the uncertainty in the nodal power distribution resulting from LPRM response uncertainty due to the extension of calibration period should not exceed the uncertainty currently assumed in the MCPR safety limit calculation.

Additionally, in response to the U.S. Nuclear Regulatory Commission (NRC) staff's requests for additional information (RAIs), the licensee provided its technical justification regarding extension of the calibration interval from 1000 MWD/T to 2000 MWD/T, and included justification for the 25 percent increase in the interval allowed by TS 3.0.2, which is summarized below:

- The licensee conducted detailed statistical evaluations of the uncertainty in LPRM calibration cases from Cycle 3 to 14 with exposure intervals up to 3000 MWD/T (Reference 1). In the analysis, over 900 points of actual calibration data were used to establish a database of various calibration intervals. Starting from an actual data point as the initial condition, a prediction of calibration current with a specified exposure interval could be made through an exponential decay equation (Reference 4). Comparing the predicted current to the actual calibrated current for the exposure interval, the percentage of deviation was obtained for the exposure interval. Since this method could skip the actual calibration point, more prediction points than actual calibration points were established in the deviation analysis. For data points with a calibration interval from 500 MWD/T to 1500 MWD/T, the relative standard deviation for 1000 MWD/T was obtained as [ ][1] percent. A similar approach was conducted for calibration interval from 1500 MWD/T to 2500 MWD/T and the relative standard deviation was determined to be [ ] percent for 2000 MWD/T (Reference 6). The decay constant used in the decay equation had variations among the 168 LPRMs. The applicant determined detector-specific decay factors for each detector and applied them in the analysis. The increase of the relative standard deviation was [ ] percent. A separate conservative approach used a fixed nominal value for all LPRMs and re-performed a similar analysis. An increase of the relative standard deviation was found to be [ ] percent in this approach.

- These evaluations showed that the equivalent LPRM response uncertainty for the increased calibration interval of 2000 MWD/T would increase the LPRM response uncertainty from 3.4 percent to [ ] percent (3.4 percent + [ ] percent), which is less than the 4.3 percent uncertainty limit currently used in calculating radial bundle power distribution for MCPR safety limit analysis.

[1]The information in [ ] contained the proprietary information and as such has been redacted in this nonproprietary version of SE.

Thus, the radial bundle power uncertainty is maintained and MCPR safety limit results remain unchanged.

- In the application dated November 1, 2006, GGNS also stated that the TS provision of SR 3.0.2 would continue to allow the LPRM calibration interval to be considered met if the calibration was performed within 1.25 times the interval specified, as measured from the previous calibration. Staff requested additional analysis from the licensee for exposure of 2500 MWD/T (2000 MWD/T x 1.25) to ensure the power uncertainty limit of the MCPR calculation was met. With a detector-specific decay factor, the analysis showed a relative standard deviation of [ ] percent with an increase of [ ] percent from an exposure interval of 1000 MWD/T ([ ] percent). With a fixed nominal decay factor, the relative standard deviation was [ ] percent and the increase of relative standard deviation was [ ] percent from an exposure interval of 1000 MWD/T [ ] percent). The increase of relative standard deviation was within 0.9 percent (4.3 percent - 3.4 percent) in the detector-specific decay factor analysis; however, the increase of relative standard deviation exceeded the 0.9 percent limit in the fixed decay factor analysis. The licensee stated in its RAI response (Reference 6), "The LPRM uncertainty results using the detector specific sensitivity values are more appropriate for the evaluation because detector specific sensitivities are used in the GGNS calibration process. Since the greater uncertainties associated with a fixed detector sensitivity are not representative of actual practice, it would be inappropriate and overly conservative to evaluate the effect of an extended calibration interval based upon a fixed detector." The licensee also performed additional analysis with plant calibration data points only (with no extrapolation of skipping actual calibration data) and showed the increase of relative standard deviation of [ ] percent for the detector-specific decay factor analysis and [ ] percent for the fixed decay factor analysis (Reference 6). The small increase ([ ] percent) in the detector-specific decay factor study was due to fewer actual calibration data points available in the exposure interval (2000 MWD/T to 3000 MWD/T), which resulted in a lower relative standard deviation. A linear extrapolation resulted in [ ] percent of relative standard deviation increase. Based on the detector-specific decay factor analysis and conservative fixed decay factor analysis on multiple sampling points (with and without exposure interval extrapolation), the staff has reasonable assurance that the allowance of the 2500 MWD/T calibration interval would not cause violation of the LPRM response uncertainty limit that is currently used in the SLMCPR calculation.

- These analyses have shown that the equivalent LPRM response uncertainty for the increased calibration interval of 2500 MWD/T would increase the LPRM response uncertainty from 3.4 percent to [ ] percent (3.4 percent + [ ] percent), which is less than the 4.3 percent uncertainty limit currently used in calculating radial bundle power distribution for MCPR safety limit analysis. Thus the radial bundle power uncertainty is maintained and MCPR safety limit results remain unchanged.

Further, in response to the NRC staff's RAI to address the concern that extension of the calibration period would lower the probability of identifying detector errors, the licensee stated

that there are various methods routinely used to identify the LPRMs that could be in error. The actual calibration process is only one such method (Reference 4). In addition to actual calibration, the methods including continuous Core Monitoring System (CMS) monitoring, every 12-hour APRM routine check (SR 3.3.1.1.1), weekly APRM channel functional Test (TS SR 3.3.1.1.3), and control room LPRM detector alarms (annunciators), monitor LPRM performance more frequently than actual calibration period. A malfunctioning or erroneous LPRM will be identified by these methods. The NRC staff finds that the licensee's response is acceptable and concludes that the extension of the calibration interval will not have adverse impact on the ability to identify a detector error.

On the basis of above discussion, the NRC finds that the proposed change to GGNS TS to increase the LPRM testing interval from 1000 MWD/T to 2000 MWD/T is acceptable, because:

- Increasing the interval between required LPRM calibrations is justified based upon the current licensing basis safety analysis and plant-specific data which confirm that the GGNS LPRM response behavior is bounded by the approved power distribution uncertainties used in the MCPR safety limit analysis. The proposed change does not affect any safety analysis methods, core thermal limits, or current safety analysis results.

- There is reasonable assurance that using NA250 series LPRM chambers in conjunction with the AREVA NP POWERPLEX-III core monitoring system and the extension of the LPRM calibration interval to 2000 MWD/T along with the TS provision of SR 3.0.2 does not pose an undue safety concern.

3.2 Conclusions - Technical Evaluation

The NRC staff concludes that the proposed change to the TS frequency of SR 3.3.1.1.7, "Calibrate the Local Power Range Monitors," from 1000 MWD/T average core exposure to 2000 MWD/T average core exposure, as discussed, is acceptable because the use of improved LPRM chambers (NA250 series) and the improved AREVA NP POWERPLEX-III core monitoring system are still maintaining the uncertainty limit of radial power distribution that is currently assumed in the GGNS SLMCPR analysis (Reference 2). Also, the TS provision of SR 3.0.2 continues to apply: the added uncertainty is still within the acceptable uncertainty limit in the SLMCPR analysis.

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 amendments involve no

significant hazards consideration, and there has been no public comment on such finding published December 5, 2006 (71 FR 70559). 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.

7.0 REFERENCES

1. Letter from W. R. Brian (EOI/GGNS) to USNRC, "Proposed Change to Technical Specifications Regarding Local Power Range Monitor Calibration Frequency (GNRO-2006/00058)," dated November 1, 2006.

2. Letter from Mr. S. Patrick Sekerak of USNRC to Mr. William A. Eaton of Entergy, "Grand Gulf Nuclear Station, Unit 1 - Issuance of Amendment Re: Revision of the Minimum Critical Power Ratio Safety Limit for Cycle 12 Operation (TAC NO. MB0514)," dated April 26, 2001 (ADAMS Accession No. ML011230243).

3. EMF-2158(P)(A), "Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2."

4. Letter from Michael A. Krupa to USNRC, "Supplement to Amendment Request Changes to Local Power Range Monitor (LPRM) Calibration Frequency Grand Gulf Nuclear Station, Unit 1 (GGNS), Docket No. 50-416, License No. NPF-29, GNRO-2007/00018," dated April 4, 2007.

5. Letter from Arthur D. Barfield to USNRC, "Supplement 2 to Amendment Request Changes to Local Power Range Monitor (LPRM) Calibration Frequency Grand Gulf Nuclear Station, Unit 1 (GGNS), Docket No. 50-416, License No. NPF-29, GNRO-2007/00031," dated May 7, 2007.

6. Letter from Arthur D. Barfield to USNRC, "Supplement 3 to Amendment Request Changes to Local Power Range Monitor (LPRM) Calibration Frequency Grand Gulf Nuclear Station, Unit I (GGNS), Docket No. 50-416, License No. NPF-29, GNRO-2007/00056," dated August 16, 2007.

7. Letter from Mr. Guy S. Vissing of USNRC to Mr. Michael Kansler of Entergy, "James A. Fitzpatrick Nuclear Power Plant - Amendment Re: Regarding Local Power Range Monitor Calibration Frequency (TAC No. MB6945)," dated May 1, 2003 (ADAMS Accession No. ML030860088).

8. Letter from Mr. Richard P. Croteau of USNRC to Mr. Samuel L. Newton of Vermont Yankee Nuclear Power Corporation, "Vermont Yankee Nuclear Power Station - Issuance of Amendment Re: Changes to Local Power Range Monitor Calibration Frequency (TAC No. MA9053)," dated July 18, 2000 (ADAMS Accession No. ML003733066).

9. Letter from Mr. Robert J. Fretz of USNRC to Mr. Randall K. Edington of Entergy, "River Bend Station, Unit 1 - Issuance of Amendment Re: Changes to Local Power Range Monitor Calibration Frequency (TAC No. M98883)," dated June 11, 1999 (ADAMS Accession No. ML021620290).

Principal Contributor: P. Lien, NRR/SRXB

Date: October 24, 2007