August 10, 2001

Mr. William A. Eaton
Vice President, Operations GGNS
Entergy Operations, Inc.
P. O. Box 756
Port Gibson, MS 39150

SUBJECT: GRAND GULF NUCLEAR STATION, UNIT 1 - ISSUANCE OF EMERGENCY AMENDMENT TO AUTHORIZE IMPLEMENTATION OF TECHNICAL SPECIFICATION 3.3.4.1, LIMITING CONDITION FOR OPERATION 3.3.4.1b. (TAC NO. MB2595)

Dear Mr. Eaton:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 148 to Facility Operating License No. NPF-29 for the Grand Gulf Nuclear Station, Unit 1 (GGNS). This amendment revises the Technical Specifications (TSs) in response to your application dated August 10, 2001.

The amendment authorizes implementation of TS 3.3.4.1, Limiting Condition for Operation 3.3.4.1 b. to be consistent with NUREG-1434, "Standard Technical Specifications General Electric Plants, BWR/6," Volume 1, Revision 2, dated June 2001. This change allows revision of reactor operational limits, as specified in the GGNS Core Operating Limits Report (COLR), to compensate for the inoperability of the End Of Cycle Recirculation Pump Trip Instrumentation.

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

Sincerely,

/RA/

S. Patrick Sekerak, Project Manager, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-416

Enclosures: 1. Amendment No. 148 to NPF-29
2. Safety Evaluation

cc w/encls: See next page

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ENTERGY MISSISSIPPI, INC.

DOCKET NO. 50-416

GRAND GULF NUCLEAR STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 148
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 August 10, 2001 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. 148, 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 prior to thermal power ascension greater than 40percent rated thermal power.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Robert A. Gramm, Chief, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: August 10, 2001

ATTACHMENT TO LICENSE AMENDMENT NO. 148

FACILITY OPERATING LICENSE NO. NPF-29

DOCKET NO. 50-416

Replace the following pages of 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.

Remove	Insert
3.3-25	3.3-25
3.3-26	3.3-26

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 148 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 letter dated August 10, 2001, Entergy Operations (Entergy or the licensee), submitted a request for U.S. Nuclear Regulatory Commission (NRC or the Commission) review and approval of an emergency license amendment request to modify the Grand Gulf Nuclear Station, Unit 1 (GGNS) Technical Specifications (TS). The licensee requested that a new Limiting Condition for Operation (LCO) 3.3.4.1b be added to TS Section 3.3 (INSTRUMENTATION). The new LCO would provide an alternative to the existing LCO 3.3.4.1a, concerning the operability of the End of Cycle Recirculation Pump Trip (EOC-RPT) Instrumentation.

2.0 BACKGROUND

GGNS TS 3.3.4.1 "End of Cycle Recirculation Pump Trip (EOC-RPT) Instrumentation," requires that:

> Two channels per trip system for each EOC-RPT Instrumentation Function listed below shall be OPERABLE:
>
> a. Turbine Stop Valve (TSV) Closure, Trip Oil Pressure-Low; and
>
> b. Turbine Control Valve (TCV) Fast Closure, Trip Oil Pressure-Low.

The requirement is applicable whenever reactor thermal power is greater than 40 percent of Rated Thermal Power (RTP) with any recirculation pump in fast speed.

The EOC-RPT instrumentation causes a recirculation pump trip (RPT) to reduce the peak reactor pressure and power resulting from a turbine trip or generator load rejection transient, in order to assure adequate margin to reactor core thermal Minimum Critical Power Ratio (MCPR) Safety Limits (SL). The trip is needed to quickly insert additional negative reactivity into the core at the start of a transient that might occur at the end of the normal operating cycle. During this period of operation, the neutron flux shape in the reactor is such that the initial control rod effectiveness is reduced during a scram, and therefore the control rods may not be able to insert sufficient negative reactivity with the first few feet of their insertion to ensure that the fuel thermal limits will be met. The fuel thermal limits are established in order to ensure that

99.9 percent of the fuel will not undergo boiling transition and potential failure of the fuel cladding during a reactor transient. The transients of concern are the Turbine Control Valve Fast closure, Trip Oil Pressure-Low; and the Turbine Stop Valve Closure, Trip Oil Pressure-Low events.

These events can be triggered by a number of initiators, such as a generator load rejection induced by a lightning strike on an external transmission line. On August 7, 2001, a lightning strike at an electrical generating station located about 25 miles away caused the generator load rejection sensor at GGNS to actuate, and it successfully initiated a reactor scram, but the EOC-RPT logic failed to actuate. This event was similar to one that occurred in September 2000. Based on an investigation of the trip event, the licensee determined that there exists a small subset of extremely short duration, large electrical faults for which the EOC-RPT cannot respond. While these events do not represent a traditional load reject, it would be appropriate for the EOC-RPT to actuate, if they were to occur. Given the inability of the EOC-RPT to respond to this particular type of event, the licensee declared the EOC-RPT system INOPERABLE, and GGNS is therefore prohibited by TS from operating above 40 percent RTP until the EOC-RPT is OPERABLE.

NUREG-1434, "Standard Technical Specifications for General Electric Plants, BWR/6," (STS) Section 3.3.4.1, includes two LCO statements associated with the EOC-RPT Instrumentation. In addition to the condition included in the GGNS TS, the STS contains an alternative LCO which states that, if the EOC-RPT function is INOPERABLE,

> b. LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)," limits for inoperable EOC-RPT as specified in the COLR are made applicable.

This LCO recognizes that the margin to fuel thermal limits that is provided by the EOC-RPT can be ensured in another way, i.e., by imposing an additional MCPR operating penalty on the reactor, with the penalty calculated using approved analytical methods, and documented in the plant Core Operating Limits Report (COLR).

When GGNS converted to the STS format, the analysis necessary to adopt this option was not completed, and the decision was made not to adopt the MCPR option because the licensee believed that it would never need to make use of STS LCO 3.3.4.1b. The emergency change request which has been submitted would now incorporate the STS LCO 3.3.4.1b into the GGNS TS, and therefore provide the licensee with an alternative method of ensuring adequate thermal margin for the fuel at the end of cycle, and would allow normal operation at 100 percent of RTP.

3.0 EVALUATION

The licensee has proposed to add the following to LCO 3.3.4.1:

> b. LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)," limits for inoperable EOC-RPT as specified in the COLR are made applicable.

An additional action that addresses the new provision in the LCO is also being added to CONDITION B, as REQUIRED ACTION B.2. The new action invokes requirements to adjust the MCPR limit within 2 hours of finding the instrumentation inoperable. The licensee has also revised the Bases section of the TS to reflect the new LCO.

The MCPR limits that are referred to in this new LCO would be incorporated into a new version of the GGNS COLR, which the licensee has committed to complete within 30 days of issuance of this amendment. In addition, the licensee has agreed to take the following actions until the new COLR limits have been developed and implemented:

1. Intentional operation with feedwater heaters out of service will not be allowed.
2. Interim MCPR operating limits will be implemented, as discussed below.
3. The existing EOC-RPT instrumentation will not be disabled, and will continue to provide protection for all transients except the small subset for which the licensee has determined that it does not actuate.

The purpose of the EOC-RPT is to provide additional MCPR operating margin. At the end of a normal operating cycle, the neutron flux shape in the reactor is such that the effectiveness ("worth") of the control rods when they are initially inserted during a scram is lower than it is earlier in the operating cycle. During a postulated pressurization transient such as a generator load rejection event, the control rod worth during the first few feet of insertion may not be sufficient to reduce reactor power quickly enough to ensure that the fuel meets the specified acceptable fuel design limits. The EOC-RPT anticipates the pressure transient that will result from a generator load rejection event, and it causes the reactor recirculation pumps to trip, as well, so that the forced circulation of water through the reactor core stops. When this occurs, the coolant void fraction (the relative amount of steam vs. liquid water) in the core rises, reducing neutron moderation and therefore reducing reactor power. The combined effects of the EOC-RPT and the scram reduce fuel bundle power more rapidly than does a scram alone, resulting in an increased margin to the MCPR SL. Natural circulation of water through the core continues at a lower rate which is sufficient to remove energy from the fuel. The EOC-RPT therefore reduces the severity of the transient with regard to the fuel thermal limits.

The EOC-RPT reduces the severity of these transients at all times during the fuel cycle, but it was intended to have its greatest effect at the end-of-cycle. GGNS analyses of this event were done by the fuel vendor (Framatome ANP Richland) using approved NRC methods, as described in the licensee's August 10, 2001 letter. The vendor has partially re-analyzed the plant behavior for the limiting transients with the EOC-RPT out of service, and developed new, more limiting MCPR values that will be incorporated into the COLR, and into the core monitoring software in the plant process computer.

In its submittal, the licensee stated that FRAMATOME has evaluated the impact of the EOC-RPT out-of-service condition, and has identified several adjustments to the MCPR limits that are necessary to support operation with no EOC-RPT from the beginning of cycle (core average exposure 19,658 MWd/MTU) until mid-cycle(core average exposure 30,840 Mwd/MTU). At this point in the cycle, the core average exposure is about 22,000 Mwd/MTU. These adjustments will be entered into the COLR and into the core monitoring software in the plant process computer, and they effectively change the initial conditions for the transients under consideration. With the new initial conditions, which are more restrictive than the case with the EOC-RPT in operation, the margin to reactor fuel thermal limits during these transients would be restored to acceptable values.

Although FRAMATOME has completed some of the analyses that are needed to support this new TS LCO, it has not completed the analyses for the Feedwater Heater out of

Service(FWHOOS) case, and therefore, the licensee will not allow intentional operation with FWHOOS until the COLR has been revised to reflect this case without the EOC-RPT. Before the plant reaches the middle of the current operating cycle, the licensee plans to implement another revision to the COLR, which will consider both operation till the end of the current operating cycle with the EOC-RPT out of service, and a planned power uprate that is expected to be submitted for staff review in early 2002.

The staff has concluded that the licensee proposal to add LCO 3.3.4.1.b and the associated Action Statement and Bases to the GGNS TS is acceptable because the addition of margin through adjustments to the MCPR limit is an acceptable alternative to providing the margin through the operation of the EOC-RPT. In the interim, until the fuel vendor completes its calculations and the licensee revises the GGNS COLR, within 30 days after this amendment has been issued, operation at GGNS is acceptable because: (1) the licensee will implement in the COLR interim MCPR limits that compensate for the loss of margin caused by the inoperable EOC-RPT, (2) the margin that accrues from operation of the EOC-RPT is small, at this point in the GGNS operating cycle, (3) the EOC-RPT will not be disabled, and actuation of this feature is still expected for turbine trip and load rejection events, even though it may not occur for a small subset of large electrical faults, and (4) the licensee will not intentionally operate the plant during this period with feedwater heaters out of service.

4.0 EMERGENCY CIRCUMSTANCES

In its August 10, 2001, letter, the licensee requested that this amendment be treated as an emergency amendment. In accordance with 10 CFR 50.91(a)(5), the licensee provided information regarding how this emergency situation occurred, and why it could not be avoided.

On August 7, 2001, GGNS had an unplanned shutdown and is currently prohibited from exceeding 40 percent RTP due to LCO 3.3.4.1 restrictions regarding inoperability of End of Cycle Recirculation Pump Trip (EOC-RPT) instrumentation. This restriction prevents the return of GGNS to full power operations. The initial probable cause for the inoperable instrumentation was an apparent design deficiency between Siemens Power Corporation (Siemens) design of its turbine controls and the General Electric (GE) EOC-RPT instrumentation. GGNS could not have anticipated the extent of the apparent design deficiency between the Siemens design of its turbine controls and the GE EOC-RPT instrumentation. Therefore, GGNS could not have foreseen this problem, and has not failed to make timely application for this amendment. The staff concludes that an emergency condition exists, in that failure to act promptly would prevent resumption of full power operation of GGNS. In addition, the staff concludes that GGNS promptly notified the staff of the deficiency, and promptly proposed this amendment request to remedy the situation. Therefore, the staff concludes that the licensee has not abused the emergency provisions by failing to make timely application for the amendment. Thus, the conditions needed to satisfy 10 CFR 50.91(a)(5) exist, and the amendment is being processed on an emergency basis.

5.0 FINAL NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission's regulations in 10 CFR 50.92(c) state that the Commission may make a final determination that a license amendment involves no significant hazards consideration if operation of the facility in accordance with the amendment would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or,

(2) Create the possibility of a new or different kind of accident from any previously evaluated; or,

(3) Involve a significant reduction in a margin of safety.

The following analysis was provided by the licensee in its August 10, 2001, letter.

1. Will operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   The EOC-RPT functions to insert negative reactivity in response to certain anticipated transients. The EOC-RPT is a mitigation function and not the initiator of any evaluated accident or transient. Operation with inoperable EOC-RPT instrumentation and compliance with new restrictive MCPR operating limits establishes the same margin to core thermal MCPR safety limit (SL) as would be the case with operable EOC-RPT instrumentation and existing MCPR operating limits.

   Therefore, this change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Will operation of the facility in accordance with the proposed change create the possibility of a new or different kind of accident from any previously analyzed?

   The requested change will not create any new modes of plant or equipment operation. The proposed change allows the option to apply an additional penalty factor to the MCPR when the EOC-RPT is inoperable. With the addition of the penalty factor, the margin to the MCPR SL is maintained. Therefore, operating the plant with the proposed change will not create the possibility of a new or different kind of accident from any previously analyzed.

3. Will operation of the facility in accordance with the proposed change involve a significant reduction in a margin of safety?

   By establishing a new restrictive MCPR operating limit, there are no changes to the plant design and safety analysis. There are no changes to the reactor core design instrument setpoints. The margin of safety assumed in the safety analysis is not affected. Applicable regulatory requirements will continue to be met and adequate defense-in-depth will be maintained. Sufficient safety margins will be maintained.

The analytical methods used to determine the revised core operating limits were reviewed and approved by the NRC, and are described in Technical Specification 5.6.5. Specific analyses were prepared by the GGNS fuel vendor to develop core operating limits without crediting the EOC-RPT. Therefore, implementation of the proposed changes will not involve a significant reduction in the margin of safety.

The NRC staff has reviewed the licensee's analysis and, based on this review, has determined that the three standards of 10 CFR 50.92(c) are satisfied. Therefore, the staff concludes that the amendment request involves no significant hazards.

6.0 COMMITMENTS

During review of the GGNS application dated August 10, 2001 (GNRO-2001/00062), the NRC staff noted that the licensee made a commitment regarding activities associated with updating the GGNS COLR to document the new restrictive MCPR operating limits. This commitment included documenting the revised MCPR limits in the COLR within 30 days of the issuance of this emergency license amendment.

The staff finds that reasonable controls for the implementation of the above regulatory commitment is best provided by the licensee's administrative process, including its commitment management program. The above regulatory commitment does not warrant the creation of specific regulatory requirements.

7.0 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.

8.0 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 made a final determination of no significant hazards consideration with respect to this amendment. 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.

9.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that (1) the amendment does not: (a) involve a significant increase in the probability or consequences of an accident previously evaluated, or (b) create the possibility of a new or different kind of accident from any previously analyzed, or (c) involve a significant reduction in the margin of safety; (2)

there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner; (3) such activities will be conducted in compliance with the Commission's regulations; and (4) 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: R. Caruso

Date: August 10, 2001

Grand Gulf Nuclear Station

cc:

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