

February 22, 2007

Mr. William R. Brian
Vice President, Operations
Grand Gulf Nuclear Station
Entergy Operations, Inc.
P. O. Box 756
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SUBJECT: GRAND GULF NUCLEAR STATION, UNIT 1 - ISSUANCE OF AMENDMENT
RE: LICENSE AMENDMENT REQUEST CHANGES TO THE ANALYTICAL
METHODS REFERENCED IN TECHNICAL SPECIFICATION 5.6.5, "CORE
OPERATING LIMITS REPORT (COLR)" (TAC NO. MD1496)

Dear Mr. Brian:

The Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 173 to Facility Operating License No. NPF-29 for the Grand Gulf Nuclear Station, Unit 1. This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated May 8, 2006, as supplemented by letter dated November 16, 2006.

The amendment added an NRC-approved topical report to the analytical methods referenced in TS Section 5.6.5, "Core Operating Limits Report (COLR)."

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. 173 to NPF-29
2. Safety Evaluation

cc w/encls: See next page

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ADAMS Accession Nos.: Pkg ML070300343 (Amd. ML070300411, License/TS Pgs ML070300425)

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Grand Gulf Nuclear Station

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ENERGY MISSISSIPPI, INC.
DOCKET NO. 50-416
GRAND GULF NUCLEAR STATION, UNIT 1
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 173
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 May 8, 2006, as supplemented by letter dated November 16, 2006, 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 and paragraph 2.C.(2) of Facility Operating License No. NPF-29, as indicated in the attachment to this license amendment.
3. This license amendment is effective as of its date of issuance and shall be implemented prior to Cycle 16 operation.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

David Terao, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Facility
Operating License and
Technical Specifications

Date of Issuance: February 22, 2007

ATTACHMENT TO LICENSE AMENDMENT NO. 173

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

<u>Remove</u>	<u>Insert</u>
4	4

Technical Specifications

<u>Remove</u>	<u>Insert</u>
5.0-20	5.0-20
5.0-20a	----
5.0-21	5.0-21

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 173 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 May 8, 2006 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML061310084), as supplemented by letter dated November 16, 2006 (ADAMS Accession No. ML063240098), Entergy Operations, Inc., et al. (Entergy, the licensee), requested changes to the Technical Specifications (TSs) for Grand Gulf Nuclear Station, Unit 1 (GGNS). The supplement dated November 16, 2006, 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 June 20, 2006 (71 FR 35458).

The proposed change will add a U.S. Nuclear Regulatory Commission (NRC) approved topical report to the analytical methods referenced in TS Section 5.6.5(b), "Core Operating Limits Report (COLR)."

Specifically, the proposed changes include deleting three references (i.e., Items 19, 20, and 21) and replacing a reference in item 18 with an NRC-approved reference, EMF-2361(P)(A), "EXEM BWR [Boiling-Water Reactor-2000 ECCS Evaluation Model," Framatome ANP Richland, Inc., in TS 5.6.5.b.

TS Section 5.6.5 requires core operating limits to be established prior to each reload cycle, or prior to any remaining portion of a reload cycle, using the analytical methods previously approved by the NRC and referenced in Section 5.6.5.b. Certain core operating limits are established based upon design-basis loss-of-coolant accident (LOCA) analyses. The current method of performing the LOCA analyses will be replaced by an updated method described in Framatome Advanced Nuclear Power (FRA-ANP) topical report, "EXEM BWR-2000 ECCS Evaluation Model."

The TS change is intended to allow GGNS to use the EXEM BWR-2000 methodology for performing LOCA analyses beginning with operating Cycle 16, currently scheduled to begin in spring 2007. The LOCA analyses will be used to establish the Average Planar Linear Heat Generation Rate (APLHGR) operating limits, imposed by TS 3.2.1. The NRC staff approved the EXEM BWR-2000 topical report by letter dated May 29, 2001, and found it to be acceptable for referencing in license applications.

GGNS currently performs LOCA analyses using the EXEM BWR Evaluation Model in conjunction with the RELAX and HUXY codes (References 19, 20, and 21 in TS 5.6.5.b). The EXEM BWR ECCS Evaluation Model (currently Reference 18) is no longer used and is being deleted. References to the topical reports for the RELAX and HUXY codes (References 20 and 21 in TS 5.6.5.b) no longer need to be listed because they are incorporated by reference into the EXEM BWR-2000 ECCS Evaluation Model topical report (new Reference 18).

2.0 REGULATORY EVALUATION

The TS 5.6.5 lists the NRC-approved analytical methods used at GGNS to determine core operating limits. The listed NRC-approved analytical methods provide the necessary administrative controls to ensure operation of the facility in a safe manner and thus are required for inclusion in the GGNS Technical Specifications in accordance with Section 50.36 of Title 10 of the *Code of Federal Regulations* (10 CFR).

The regulatory requirements and guidance that the NRC staff considered in its review of the application are as follows:

1. Title 10 of the *Code of Federal Regulations* establishes the fundamental regulatory requirements with respect to the reactivity control systems. Specifically, General Design Criterion 10 (GDC-10), "Reactor design," in Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 states, in part, that the 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.
2. Section 50.36, paragraph (c)(5) of 10 CFR, states that the TS will include administrative controls that address the provisions relating to organization and management, procedures, record keeping, review and audit, and reporting necessary to assure operation of the facility in a safe manner. The COLR is required as a part of the reporting requirements specified in the GGNS TS Administrative Controls section. The TS requires the core operating limits to be established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and to be documented in the COLR. In addition, it requires the analytical methods used to determine the core operating limits to be approved by the NRC and described in the Administrative Controls section of the TS.
3. Generic Letter (GL) 88-16, "Removal of Cycle-Specific Parameter Limits from Technical Specifications," and Technical Specification Task Force (TSTF) traveler TSTF-363, "Revise Topical Report References in ITS [Improved Technical Specification] 5.6.5, COLR," provide guidance on the method of referencing topical reports in the TS and the COLR. TSTF-363, which was approved by the NRC on July 6, 2000, requires the titles of the analytical methods to be included in TS 5.6.5.b and the complete identification (report number, title, revision, date, and any supplements) to be included in the COLR.
4. Section 50.46 of 10 CFR, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors," requires each boiling or

pressurized light-water nuclear power reactor fueled with uranium oxide pellets within cylindrical zircaloy or ZIRLO cladding to be provided with an ECCS designed so that its calculated cooling performance following postulated LOCAs conforms to certain criteria. Specifically related to this proposed TS change is a criterion that the calculated maximum fuel element cladding temperature shall not exceed 2200°F. In addition, the ECCS cooling performance must be calculated in accordance with an acceptable evaluation model.

3.0 TECHNICAL EVALUATION

3.1 Background

Core operating limits are established each operating cycle in accordance with TS 3.2, "Power Distribution" and TS 5.6.5, "Core Operating Limits Report (COLR)." These operating limits ensure that the fuel design limits are not exceeded during any conditions of normal operation or in the event of any anticipated operational occurrence (AOO). In addition, the APLHGR operating limits imposed by TS 3.2.1 also ensure that the peak cladding temperature (PCT) during the postulated design-basis LOCA does not exceed the 2200°F limit specified in 10 CFR 50.46.

The methods used to determine the operating limits are those previously found acceptable by the NRC and listed in TS Section 5.6.5.b. The analytical methods currently listed support the determination of core operating limits by using those methods applicable to fuel supplied by General Electric (GE, currently known as Global Nuclear Fuels) or FRA-ANP, formerly known as Siemens. GGNS has employed fuel supplied by GE or FRA-ANP since it began commercial operation but is only using FRA-ANP ATRIUM-10 fuel in the current operating cycle. GGNS also plans to continue using ATRIUM-10 fuel in the next operating cycle, Cycle 16.

The requested TS change will add a previously approved FRA-ANP topical report to the references listed in TS Section 5.6.5.b. Topical Report EMF-2361(P)(A), "EXEM BWR-2000 ECCS Evaluation Model," describes an updated method of performing ECCS evaluations under design-basis LOCA conditions. GGNS currently performs the LOCA analysis using the EXEM BWR methodology described in Topical Report ANF-91-048(P)(A), "Advanced Nuclear Fuels Corporation Methodology for Boiling Water Reactors EXEM BWR Evaluation Model." The LOCA analysis is used to establish the APLHGR limits required by TS 3.2.1.

One of the principal reasons for the updated methodology was to address some issues raised during a 1997 NRC Core Performance Inspection of FRA-ANP. The inspection included an assessment of the EXEM BWR evaluation model. The assessment determined that the benchmarking and validation of certain computer codes used to support the evaluation model needed to be improved. These concerns were addressed by the development and approval of the EXEM BWR-2000 ECCS evaluation model. As part of the resolution of the NRC assessment issues, the older EXEM BWR evaluation model will no longer be used. This necessitates the need for the GGNS LOCA analysis to be reanalyzed with the EXEM BWR-2000 model. The proposed TS change, if approved, will be implemented beginning with GGNS operating Cycle 16.

3.2 Evaluation

The APLHGR limits required by TS 3.2.1 are specified in the COLR and are the result of fuel design, design-basis accident (DBA), and transient analyses. The APLHGR is a measure of the average linear heat generation rate of all the fuel rods in a fuel assembly at any axial location. Limits on the APLHGR are specified to ensure that the fuel design limits are not exceeded during AOOs and that the PCT during the postulated design-basis LOCA does not exceed the 2200 °F limit specified in 10 CFR 50.46.

GGNS currently uses the NRC-approved EXEM BWR evaluation model for the LOCA analysis. GGNS proposes to use an updated FRA-ANP LOCA analytical method beginning in operating Cycle 16. The updated method is described in Topical Report EMF-2361(P)(A), "EXEM BWR-2000 ECCS Evaluation Model." The NRC found the topical report to be acceptable for referencing in license applications and issued its safety evaluation providing the basis for acceptance by letter dated May 29, 2001.

The NRC review of the EXEM BWR-2000 model concluded the following:

... The staff notes that from validation against test data, the large-break DBA PCTs were conservatively calculated. The test results for small breaks show low temperatures, and the EXEM BWR-2000 model using evaluation model options bounds the temperature data. Furthermore, the EXEM BWR-2000 model adequately predicts the important LOCA phenomena.

The staff, therefore, concludes that the proposed EXEM BWR-2000 ECCS EM, as documented in References 1, 2, 4, and 5 [referenced in the May 29, 2001, NRC review letter], is acceptable for referencing in BWR LOCA analyses, with the limitation that application of the revised evaluation model will be limited to jet pump plant applications.

A GGNS plant-specific LOCA analysis was performed by FRA-ANP using the EXEM BWR-2000 evaluation model. The analysis assumed a full core of ATRIUM-10 fuel and used a generic ATRIUM-10 neutronic design that is expected to be conservative relative to actual cycle-specific designs. A cycle-specific evaluation is performed each cycle to confirm that the generic fuel design remains bounding.

The results of the new GGNS LOCA analysis were compared with the current licensing-basis analysis, which uses the older EXEM BWR evaluation model. Tables 1 through 5 included in the attachment in the licensee's May 8, 2006, application, provide the key input parameters used in both the current licensing-basis analysis and the new analysis. The currently calculated LOCA PCT for ATRIUM-10 fuel, using the older EXEM BWR model, is 1797 °F. The LOCA PCT for ATRIUM-10 fuel, using the new EXEM BWR-2000 model, is 1895 °F. As such, there is an increase in PCT of 98 °F associated with the change in the LOCA analysis. However, Entergy, in its submissions, explained that the new analysis assumes that the plant is operating at a lower Minimum Critical Power Ratio (MCPR) at the start of the event. This lower MCPR input value results in an increase in PCT but does not impact the current MCPR Safety Limits provided in TS 2.1.1.2. The new analysis also conservatively assumed that only six out of eight Automatic Depressurization System (ADS) valves were available; whereas, the current analysis assumed seven were available. The assumption is conservative since the TSs do not allow

plant operation with less than seven operable ADS valves. The resulting PCT of 1895°F, using the EXEM BWR-2000 model for the LOCA analyses, still affords adequate margin to the 2200°F limit of 10 CFR 50.46.

Entergy determined, and the NRC staff finds it acceptable, that the FRA-ANP EXEM BWR-2000 evaluation model is acceptable for GGNS LOCA analyses. The GGNS plant design meets the limitation stipulated in the NRC safety evaluation since it is a BWR-6 plant that incorporates jet pumps in its design. GGNS uses FRA-ANP ATRIUM-10 fuel in its current operating cycle (Cycle 15) and plans to continue using ATRIUM-10 fuel in operating Cycle 16.

In summary, the EXEM BWR-2000 evaluation model is an improved method of evaluating ECCS performance with LOCA analyses. The model has been reviewed and approved by the NRC and is applicable to the GGNS plant design and the fuel being used at GGNS. The application of the LOCA analysis model will continue to ensure that the APLHGR operating limits are established to protect the fuel cladding integrity during normal operation, AOOs, and the design-basis LOCA.

3.3 Regulatory Commitments

The following table identifies those actions committed to by Entergy in conjunction with this amendment request:

List of Regulatory Commitments

COMMITMENT	TYPE (Check one)		SCHEDULED COMPLETION DATE (If Required)
	One- Time Action	Continuing Compliance	
The commitments made in the letter dated November 16, 2006:			
The planned COLR changes will be included in the COLR revision for the upcoming reload cycle.	X		4/30/2007
Therefore, the COLR will be revised to indicate which methods are applicable when GE fuel is resident in the reactor core. The planned COLR changes will be included in the COLR revision for the upcoming reload cycle.	X		4/30/2007

The NRC staff finds that reasonable controls for the implementation and for subsequent evaluation of proposed changes pertaining to the above regulatory commitments are provided by the licensee's administrative processes, including its commitment management program.

Should the licensee choose to incorporate a regulatory commitment into the emergency plan, updated final safety analysis report, or other documents with established regulatory controls, the associated regulations would define the appropriate change-control and reporting requirements.

The NRC staff has determined that the commitments do not warrant the creation of regulatory requirements, which would require prior NRC approval of subsequent changes. The NRC staff has agreed that Nuclear Energy Institute 99-04, Revision 0, "Guidelines for Managing NRC Commitment Changes," provides reasonable guidance for the control of regulatory commitments made to the NRC staff (see Regulatory Issue Summary 2000-17, "Managing Regulatory Commitments Made by Power Reactor Licensees to the NRC Staff," dated September 21, 2000). The commitments should be controlled in accordance with industry guidance or comparable criteria employed by a specific licensee. The NRC staff may choose to verify the implementation and maintenance of these commitments in a future inspection or audit.

3.4 Conclusion - Technical Evaluation

The NRC staff has reviewed the application by Entergy, as supplemented, to revise the TS for GGNS. Based on its review, the NRC staff finds that the proposed TS changes: (1) to delete three references; and (2) to replace the EXEM BWR ECCS Evaluation Model by an updated EXEM BWR-2000 ECCS Evaluation Model, are acceptable because three deleted references are no longer in use for Cycle 16 LOCA analyses and the updated ECCS evaluation model is an approved method to be used for the Cycle 16 analyses to support TS 3.2.1 APLHGR parameter, which are in accordance with the guidance specified in GL 88-16.

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 June 20, 2006 (71 FR 35458). 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: T. Huang, SBWB

Date: February 22, 2007