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

October 20, 1999

SUBJECT: GRAND GULF NUCLEAR STATION, UNIT 1 - ISSUANCE OF AMENDMENT RE: OPERATIONAL CONDITIONS FOR HANDLING IRRADIATED FUEL IN THE PRIMARY OR SECONDARY CONTAINMENT (TAC NO. MA5985)

Dear Mr. Eaton:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 139 to Facility Operating License No. NPF-29 for the Grand Gulf Nuclear Station, Unit 1. This amendment revises the Technical Specifications (TSs) in response to your application dated June 23, 1999 (GNRO-99/00049), as supplemented by your submittals dated August 6, 1999 (GNRO-99/00063), September 8, 1999 (GNRO-99/00070), and October 4, 1999 (GNRO-99/00075).

The amendment revises TS requirements for handling irradiated fuel in the Containment Building and in the Auxiliary Building, and selected specifications associated with performing core alterations.

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,

ORIGINAL SIGNED BY:

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

Docket No. 50-416

Enclosures:
1. Amendment No. 139 to NPF-29
2. Safety Evaluation

cc w/encls: See next page

* See previous concurrence

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Grand Gulf Nuclear Station

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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. 139
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 June 23, 1999, as supplemented by letters dated August 6, September 8, and October 4, 1999, 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 Operating License and 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. 139 , 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 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

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

Attachment: Changes to the Operating License and the Technical Specifications

Date of Issuance: October 20, 1999

ATTACHMENT TO LICENSE AMENDMENT NO. 139

FACILITY OPERATING LICENSE NO. NPF-29

DOCKET NO. 50-416

Replace the following pages of the Operating License and 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
4	4
4a	---
3.3-51	3.3-51
3.3-52	3.3-52
3.3-55	3.3-55
3.3-62	3.3-62
3.6-13	3.6-13
3.6-42	3.6-42
3.6-43	3.6-43
3.6-45	3.6-45
3.6-47	3.6-47
3.6-49	3.6-49
3.6-50	3.6-50

(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 3833 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. ___ are hereby incorporated into this license. Entergy Operations, Inc. shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

Page Deleted

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
J. (continued)	J.3.1 Initiate action to restore secondary containment to OPERABLE status. AND	Immediately
	J.3.2 Initiate action to restore one standby gas treatment (SGT) subsystem to OPERABLE status. AND	Immediately
	J.3.3 Initiate action to restore isolation capability in each required secondary containment penetration flow path not isolated.	Immediately
K. As required by Required Action C.1 and referenced in Table 3.3.6.1-1.	K.1 Isolate the affected penetration flow path(s). OR	Immediately
	K.2.1 Suspend movement of recently irradiated fuel assemblies in the primary and secondary containment. AND	Immediately

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
K. (continued)	K.2.2 Initiate action to suspend operations with a potential for draining the reactor vessel.	Immediately

Table 3.3.6.1-1 (page 2 of 5)
Primary Containment and Drywell Isolation Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION C.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
2. Primary Containment and Drywell Isolation (continued)					
b. Drywell Pressure — High	1,2,3	2[(b)]	H	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.6 SR 3.3.6.1.7	≤ 1.43 psig
c. Reactor Vessel Water Level — Low Low Low, Level 1 (ECCS Divisions 1 and 2)	1,2,3	2[(b)]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.6 SR 3.3.6.1.7	≥ -152.5 inches
d. Drywell Pressure — High (ECCS Divisions 1 and 2)	1,2,3	2	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.6 SR 3.3.6.1.7	≤ 1.44 psig
e. Reactor Vessel Water Level — Low Low, Level 2 (HPCS)	1,2,3	4	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.6 SR 3.3.6.1.7	≥ -43.8 inches
f. Drywell Pressure — High (HPCS)	1,2,3	4	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.3 SR 3.3.6.1.6 SR 3.3.6.1.7	≤ 1.44 psig
g. Containment and Drywell Ventilation Exhaust Radiation — High	1,2,3	2[(b)]	F	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.7	≤ 4.0 mR/hr
	(c)	2	K	SR 3.3.6.1.1 SR 3.3.6.1.2 SR 3.3.6.1.5 SR 3.3.6.1.7	≤ 4.0 mR/hr
h. Manual Initiation	1,2,3	2[(b)]	G	SR 3.3.6.1.7	NA
	(c)	2	G	SR 3.3.6.1.7	NA

(continued)

(b) Also required to initiate the associated drywell isolation function.

(c) During movement of recently irradiated fuel assemblies in primary or secondary containment and operations with a potential for draining the reactor vessel.

Table 3.3.6.2-1 (page 1 of 1)
Secondary Containment Isolation Instrumentation

FUNCTION	APPLICABLE MODES AND OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Reactor Vessel Water Level — Low Low, Level 2	1,2,3,(a)	2	SR 3.3.6.2.1 SR 3.3.6.2.2 SR 3.3.6.2.3 SR 3.3.6.2.5 SR 3.3.6.2.6	≥ -43.8 inches
2. Drywell Pressure — High	1,2,3	2	SR 3.3.6.2.1 SR 3.3.6.2.2 SR 3.3.6.2.3 SR 3.3.6.2.5 SR 3.3.6.2.6	≤ 1.43 psig
3. Fuel Handling Area Ventilation Exhaust Radiation — High High	1,2,3, (a),(b)	2	SR 3.3.6.2.1 SR 3.3.6.2.2 SR 3.3.6.2.4 SR 3.3.6.2.6 SR 3.3.6.2.7	≤ 4.0 mR/hr
4. Fuel Handling Area Pool Sweep Exhaust Radiation — High High	1,2,3, (a),(b)	2	SR 3.3.6.2.1 SR 3.3.6.2.2 SR 3.3.6.2.4 SR 3.3.6.2.6 SR 3.3.6.2.7	≤ 35 mR/hr
5. Manual Initiation	1,2,3, (a),(b)	2	SR 3.3.6.2.6	NA

(a) During operations with a potential for draining the reactor vessel.

(b) During movement of recently irradiated fuel assemblies in the primary or secondary containment.

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
E. Required Action and associated Completion Time of Condition A, B, C, or D not met in MODE 1, 2, or 3.	E.1	Be in MODE 3.	12 hours
	AND		
	E.2	Be in MODE 4.	36 hours
F. Required Action and associated Completion Time of Condition A, B, C, or D not met for PCIV(s) required to be OPERABLE during movement of recently irradiated fuel assemblies in the primary or secondary containment.	F.1	--------NOTE-------- LCO 3.0.3 is not applicable. ---------- Suspend movement of recently irradiated fuel assemblies in primary and secondary containment.	Immediately
G. Required Action and associated Completion Time of Condition A, B, C, or D not met for PCIV(s) required to be OPERABLE during MODE 4 or 5 or during operations with a potential for draining the reactor vessel (OPDRVs).	G.1	Initiate action to suspend OPDRVs.	Immediately
	OR		
	G.2	Initiate action to restore valve(s) to OPERABLE STATUS.	Immediately

3.6 CONTAINMENT SYSTEMS

3.6.4.1 Secondary Containment

LCO 3.6.4.1 The secondary containment shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
During movement of recently irradiated fuel assemblies in the primary or secondary containment,
During operations with a potential for draining the reactor vessel (OPDRVs).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Secondary containment inoperable in MODE 1, 2, or 3.	A.1 Restore secondary containment to OPERABLE status.	4 hours
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	12 hours 36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Secondary containment inoperable during movement of recently irradiated fuel assemblies in the primary or secondary containment or during OPDRVs.	C.1 --------NOTE-------- LCO 3.0.3 is not applicable. ---------- Suspend movement of recently irradiated fuel assemblies in the primary and secondary containment.	Immediately
	AND	
	C.2 Initiate action to suspend OPDRVs.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.4.1.1	Verify all auxiliary building and enclosure building equipment hatches and blowout panels are closed and sealed.	31 days
SR 3.6.4.1.2	Verify each auxiliary building and enclosure building access door is closed, except when the access opening is being used for entry and exit.	31 days

(continued)

3.6 CONTAINMENT SYSTEMS

3.6.4.2 Secondary Containment Isolation Valves (SCIVs)

LCO 3.6.4.2 Each SCIV shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
During movement of recently irradiated fuel assemblies in the primary or secondary containment,
During operations with a potential for draining the reactor vessel (OPDRVs).

ACTIONS

----------NOTES----------
1. Penetration flow paths may be unisolated intermittently under administrative controls.

2. Separate Condition entry is allowed for each penetration flow path.

3. Enter applicable Conditions and Required Actions for systems made inoperable by SCIVs.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more penetration flow paths with one SCIV inoperable.	A.1 Isolate the affected penetration flow path by use of at least one closed and de-activated automatic valve or damper, closed manual valve or damper, or blind flange. AND	8 hours (continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION		COMPLETION TIME
D. Required Action and associated Completion Time of Condition A or B not met during movement of recently irradiated fuel assemblies in the primary or secondary containment or during OPDRVs.	D.1	--------NOTE-------- LCO 3.0.3 is not applicable. ---------- Suspend movement of recently irradiated fuel assemblies in the primary and secondary containment.	Immediately
	AND		
	D.3	Initiate action to suspend OPDRVs.	Immediately

3.6 CONTAINMENT SYSTEMS

3.6.4.3 Standby Gas Treatment (SGT) System

LCO 3.6.4.3 Two SGT subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
During movement of recently irradiated fuel assemblies in the primary or secondary containment,
During operations with a potential for draining the reactor vessel (OPDRVs).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One SGT subsystem inoperable.	A.1 Restore SGT subsystem to OPERABLE status.	7 days
B. Required Action and associated Completion Time of Condition A not met in MODE 1, 2, or 3.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	12 hours 36 hours
C. Required Action and associated Completion Time of Condition A not met during movement of recently irradiated fuel assemblies in the primary or secondary containment or during OPDRVs.	----------NOTE---------- LCO 3.0.3 is not applicable. ---------- C.1 Place OPERABLE SGT subsystem in operation. OR	Immediately (continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. (continued)	C.2.1 Suspend movement of recently irradiated fuel assemblies in the primary and secondary containment. AND	Immediately
	C.2.2 Initiate action to suspend OPDRVs.	Immediately
D. Two SGT subsystems inoperable in MODE 1, 2, or 3.	D.1 Enter LCO 3.0.3.	Immediately
E. Two SGT subsystems inoperable during movement of recently irradiated fuel assemblies in the primary or secondary containment or during OPDRVs.	E.1 Suspend movement of recently irradiated fuel assemblies in the primary and secondary containment. AND	Immediately
	E.2 Initiate action to suspend OPDRVs.	Immediately

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 139 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 June 23, 1999, as supplemented by submittals dated August 6, 1999, September 8, 1999, and October 4, 1999, Entergy Operations, Inc., et al. (the licensee) requested changes to the Grand Gulf Nuclear Station, Unit 1 (GGNS), Technical Specifications (TSs) applicable during the handling of irradiated fuel in the Containment Building and in the Auxiliary Building, and selected specifications associated with CORE ALTERATIONS. The changes would revise the TSs to establish a point where OPERABILITY of those systems typically used to mitigate the consequences of a fuel handling accident (FHA) is no longer required to meet the Standard Review Plan (SRP) acceptance criteria on offsite dose effects (i.e., less than 25 percent of Part 100 limits of Title 10 of the *Code of Federal Regulations* (10 CFR)). Specifically, the proposal identifies that only "recently" irradiated fuel contains sufficient fission products to require OPERABILITY of accident mitigation features to meet the accident analysis assumptions. Therefore, the APPLICABILITY requirements for the associated mitigation features are revised.

The licensee has performed an FHA dose analysis that takes credit for a radioactive decay period that is longer than the 24-hour period originally assumed. Given this longer decay period, the licensee proposed changes to redefine the TS requirements by relaxing Containment/Auxiliary Building integrity requirements, and relaxing requirements for those engineered safety feature (ESF) systems originally relied upon to mitigate an FHA. To implement the above concepts, these TSs will only apply if fuel has been "recently irradiated." The term "recently irradiated" is a cycle-specific number and represents the decay period for the reduction in radionuclide inventory available for release in the event of an FHA. The licensee's FHA dose analysis has determined that the radionuclide inventory has sufficiently decreased after 8 days to assure that the consequences are within the applicable dose acceptance criteria. In summary, the licensee has demonstrated by reanalysis of the postulated design basis FHA (which does not rely on either building integrity or the FHA mitigating systems) that once the reactor has been shut down for a minimum of 8 days, offsite dose limitations will not be exceeded. The Control Room Fresh Air System has been credited in order to maintain control room doses within acceptable limits. On the basis of the licensee's FHA reanalysis, the existing shutdown safety controls in the affected TSs are no longer required. The TS Bases are revised to provide a definition of the term "recently irradiated" fuel.

The August 6, September 8, and October 4, 1999, submittals provided additional clarifying information and did not change the initial proposed no significant hazards consideration determination and did not expand the scope of the original application.

2.0 BACKGROUND

2.1 Regulatory Requirements for Shutdown Operation

Historic development of regulatory requirements for nuclear power plant operation was based on the premise that most risk was due to operation at power and, consequently, protection of the public could be ensured by designs and operations that conservatively bounded all conditions by achieving defense-in-depth for power operation. Fuel movement was recognized as an exception to this principle, and was judged as an area where additional regulatory protection was necessary. This is reflected in the TSs where there are many containment requirements during power operation, but few requirements, outside of fuel handling and related operations, applicable to Cold Shutdown and Refueling Modes.

During the late 1980s and early 1990s, the staff and industry realized that significant risk reductions could be achieved during shutdown operation. The staff responded with a rulemaking effort and industry implemented voluntary initiatives to realize risk reductions. However, work to improve TSs concentrated on power operation specifications, and shutdown TSs were not modified to reflect the reduction in risk.

In regard to shutdown operation, on July 30, 1997, the staff credited the effectiveness of industry's voluntary actions in well-operated plants by informing the Commission that such voluntary "...initiatives have been successful in achieving the acceptable level of risk that now exists at U.S. nuclear power plants" and "The practical effect of rule implementation is, therefore, not to raise the current level of safety, but rather to ensure that at least the current level of safety will be maintained."[1] On December 11, 1997, the Commission decided not to issue a shutdown rule for comment. Instead, the Commission instructed the staff to "...continue to monitor licensee performance, through inspections and other means, in the area of shutdown operations to ensure that the current level of safety is maintained."[2] The major component of the Commission's decision not to issue a shutdown rule was the effective voluntary actions in place in the well-run nuclear power plants, and the expectation that those or equally effective actions would continue.

One aspect of enhanced understanding of shutdown operation is an understanding that the risk due to potential FHAs, particularly if the decay heat generation rate is low, is almost nil, whereas the risk due to many other shutdown operations is comparable to, and sometimes exceeds, the risk during power operation. Yet, TSs for fuel handling are more restrictive than those for other aspects of shutdown operation. With respect to containment during the Cold

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[1]Issuance for Public Comment of Proposed Rulemaking Package for Shutdown and Fuel Storage Pool Operation," SECY-97-168, July 30, 1997.

[2]Staff Requirements - SECY-97-168 - Issuance for Public Comment of Proposed Rulemaking Package for Shutdown and Fuel Storage Pool Operation," Staff Requirements Memorandum, December 11, 1997.

Shutdown and Refueling Modes, the only requirement applies to fuel movement and related operations; there are no other containment requirements. The licensee has recognized this paradox, and is proposing to relax TS requirements during fuel handling when an appropriately low decay heat generation rate has been achieved, while committing to ensure an available containment during Cold Shutdown and Refueling Mode operation via administrative procedures. The licensee states that this TS relaxation will permit the optimization of outages to achieve an overall risk reduction while also reducing outage time and cost. A significant contributor to this risk reduction is the ability to postpone operations early in the outage that, from a practical standpoint to achieve a short outage time, must be performed soon after shutdown when there is no TS requirement for a closed containment. The requested amendment will allow some of these operations to be accomplished later, when the reactor vessel is open and covered by several feet of water, at a time when the risk of a severe core damage accident is almost nil. The trade-offs between the requested TS relaxation during fuel handling and the voluntary actions to achieve containment closure during Cold Shutdown and Refueling Mode operations, with a corresponding reduction in risk, are basic to the staff's approval of the licensee's request.

2.2 Original Requirements / Licensee's Proposal

The licensee has implemented NUREG-1434, Revision 1, "BWR-6 Improved Standard Technical Specifications." These TSs have a number of operational restrictions during shutdown conditions. The shutdown conditions requiring TS OPERABILITY are captured in the APPLICABILITY statements of the TSs. The standard wording of the APPLICABILITY statements during shutdown are as follows:

> During movement of irradiated fuel assemblies in the primary containment,
> During CORE ALTERATIONS,
> During operations with a potential for draining the reactor vessel (OPDRVs).

Structures such as the Primary Containment, the Auxiliary Building/Enclosure Building must be OPERABLE during the above conditions. Similarly, systems related to performing core alterations must also be OPERABLE during the above conditions. However, outside of the above conditions, OPERABILITY of the Primary Containment, the Secondary Containment, and systems related to performing core alterations are not required.

During refueling outages, movement of large equipment into or out of the Primary Containment or the Auxiliary Building (such as chemical-decontamination equipment, inservice examination/test equipment, or large component parts that require repair) must either be completed prior to establishing OPERABILITY or delayed until after OPERABILITY is required. Real dollar losses are incurred due to the inability of specialized contractors to perform their designated activities due to delays in performance of critical path activities. Also, productivity losses occur when personnel are involved in multiple evolutions of establishing, maintaining, and releasing OPERABILITY. Relaxation of TS OPERABILITY for Primary and Secondary Containment during shutdown conditions would alleviate these performance obstacles. The resulting gains in work flow efficiency, coupled with the increased flexibility for scheduling testing and maintenance activities on containment valves and instrumentation, can result in significant accrued cost reductions and productivity enhancements over the remaining operating life of the plant, allowing outage resources to be directed to other activities, which ultimately will result in improvements in plant maintenance, operations, and overall safety.

The licensee has proposed to relax TS requirements during shutdown conditions to take credit for the normal decay of irradiated fuel, reanalyze the design-basis accident during shutdown conditions (i.e., the FHA), and, thus, not to require either building integrity or operability of the FHA mitigating systems during shutdown conditions.

On many plant dockets, including GGNS, the NRC has determined that the FHA is acceptable when conservatively calculated dose analyses result in doses that remain less than 25 percent of 10 CFR Part 100 guidelines. This is also reflected in SRP 15.7.4, "Radiological Consequences of Fuel Handling Accidents." Typically for boiling water reactors, these types of dose analyses show that fuel handling is acceptable to begin once 24 hours has passed after entry into a plant shutdown. GGNS has filtration capabilities in the ventilation system for fuel handling areas, and their current analyses take credit for the filtration in reducing doses.

The alternative approach being proposed is to take credit for the normal decay of irradiated fuel rather than crediting the active mitigative systems (e.g., ventilation and filtration systems). Since radioactive decay is a natural phenomenon, it has a reliability of 100 percent in reducing the radiological release from the fuel bundles. The water that covers the fuel bundles naturally provides an adequate barrier to a significant radiological release. This defense-in-depth will continue to be enforced by TS controls (TS 3.9.6, "Reactor Pressure Vessel (RPV) Water Level - Irradiated Fuel," requires that RPV water level be greater than or equal to 22 feet 8 inches above the top of the RPV flange).

By letter dated June 23, 1999, the licensee provided a revised offsite dose calculation showing that the consequences of an FHA would remain less than 25 percent of 10 CFR Part 100 guidelines discussed above, after the fuel had undergone radioactive decay for several days. The length of this "several day" period is determined by a plant-specific dose calculation. The analysis took no credit for the primary containment, the secondary, or the installed ventilation systems (including their filtration capabilities) after this extended period of decay. The submittal proposed that the NRC should permit core alteration/fuel handling activities to occur after this period of radioactive decay, without requiring TS controls over building integrity and ventilation system/filtration operability. The period of decay that was used for GGNS is 8 days. Thus, the licensee's analyses show that 8 days following reactor shutdown, due to the natural decay of irradiated fuel, the offsite dose resulting from the FHA will not exceed 25 percent of 10 CFR Part 100 even if credit is not taken for building integrity or FHA mitigating systems.

The licensee proposed large-scale relaxations to the TSs by revising the APPLICABILITY statements for shutdown conditions for structures (e.g., Primary Containment and Secondary Containment) and systems previously used to mitigate the consequences of an FHA. The APPLICABILITY statements were to be revised as follows:

> During movement of *recently* irradiated fuel assemblies in the primary containment or fuel handling building,
> ~~During CORE ALTERATIONS,~~
> During operations with a potential for draining the reactor vessel (OPDRVs).

In order to implement the above APPLICABILITY statements, Limiting Conditions for Operation (LCOs) for INTEGRITY and for the selected ESF systems need only apply if fuel that has recently been in the critical reactor core (i.e., "recently irradiated fuel") is handled during the first several days of an outage (prior to completion of the longer decay period). The TS Bases will

be revised to identify "recently irradiated fuel" as fuel that has occupied part of a critical reactor core within the previous 8 days.

The deletion of the CORE ALTERATIONS term is justified since an FHA is the only event during CORE ALTERATIONS that is postulated to result in fuel damage and radiological release, and such FHAs will be fully enveloped by the proposed APPLICABILITY.

In addition to the above changes to the APPLICABILITY statements, the licensee proposed numerous corresponding changes to the ACTION statements, such as elimination of references to CORE ALTERATIONS and the insertion of *"recently* irradiated fuel" when referring to the movement of irradiated fuel.

The proposed changes do not impact TS requirements for systems needed to prevent or mitigate CORE ALTERATION events other than the FHA. They also do not change the requirements for systems needed to mitigate potential vessel draindown events, systems needed for decay heat removal, or the requirements to maintain high water levels over irradiated fuel.

The licensee-proposed relaxation of the shutdown safety controls involves changes to the following TSs and Operating License condition:

TS 3.3.6.1 - Primary Containment and Drywell Isolation Instrumentation
TS 3.3.6.2 - Secondary Containment Isolation Instrumentation
TS 3.6.1.3 - Primary Containment Isolation Valves (due to proposed Applicability of TS 3.3.6.1, Function 2.g)
TS 3.6.4.1 - Secondary Containment
TS 3.6.4.2 - Secondary Containment Isolation Valves
TS 3.6.4.3 - Standby Gas Treatment System
Operating License Condition 2.C.(2)

3.0 EVALUATION

The staff's review focused on the following four areas:

1. Dose Calculations - Control room and offsite dose consequences must be within acceptable regulatory limits without taking credit for the integrity of the Primary Containment or the Secondary Containment, as well as the FHA mitigating systems.

2. Administrative Controls - Shutdown safety controls must address (a) procedures to assess the impact of removing systems from service during shutdown conditions, (b) the ability to implement prompt methods to close both the Primary Containment and the Secondary Containment (Auxiliary/Enclosure Building) in the event of an FHA, and (c) controls to avoid unmonitored releases.

3. Risk Significance - The licensee's risk-related discussion needs to support the proposed TS changes.

4. Shutdown Operations - The licensee's proposed amendment should be consistent with the Commission's December 11, 1997, instructions to the staff.

3.1 FHA Reanalysis

The staff reviewed the licensee's justification for allowing relaxation of the Primary Containment and Secondary Containment integrity requirements during fuel handling activities. As part of this review, the staff reviewed the licensee's reanalysis of the FHA.

The proposed amendment would:

1. Establish the new term, "recently irradiated fuel," for discussion of the handling of irradiated fuel assemblies. The licensee defines "recently irradiated fuel" as fuel that has occupied part of a critical reactor core within the previous 8 days.

2. Redefine the operability requirements of accident mitigation systems for handling "recently irradiated fuel" during reactor operational Modes 4 and 5.

3. Delete the constraint on operations during reactor CORE ALTERATIONS.

Specifically, the licensee requested that:

1. The Applicability Statements for each of the following LCOs in the GGNS TS should be amended from the existing wording "when handling irradiated fuel assemblies" to the proposed wording "when handling *recently* irradiated fuel assemblies." Also, the licensee requested to revise wording of both the Conditions and Required Actions to be consistent with the requested change in the LCOs.

   TS Section 3.3.6.1, "Primary Containment and Drywell Isolation Instrumentation,"
   TS Section 3.3.6.2, "Secondary Containment Isolation Instrumentation,"
   TS Section 3.6.4.1, "Secondary Containment,"
   TS Section 3.6.4.2, "Secondary Containment Isolation Valves," and
   TS Section 3.6.4.3, "Standby Gas Treatment System."

   This amendment will not require the operability of certain fuel handling accident mitigation systems (shutdown safety controls) during reactor operational Modes 4 and 5 not involving *recently* irradiated fuel.

2. The Applicability Statements for the preceding LCOs should be amended to no longer require that the LCO be met during CORE ALTERATIONS. Also, the licensee requested revision of the wording of both the Conditions and Required Actions to be consistent with the requested change in the corresponding Applicability Statements.

3. The wording appended to Operating License Condition 2.C(2) describing an exception to this license condition as a one-time-only allowance should be deleted. This one-time-only allowance for revision of certain operability requirements during shutdown, granted by Amendment 129, was applicable only during GGNS Refueling Outage RFO8, and is no longer required. This is an administrative change request.

The objective of this license amendment is to revise the operability requirements for FHA mitigating systems during reactor operational Modes 4 and 5. During these modes, the limiting accident that results in a significant fission product release is the FHA. The current GGNS

licensing basis includes the consideration of two FHAs. The FHAs in the auxiliary building and in the containment building are evaluated in the GGNS Updated Final Safety Analysis Report (UFSAR), Sections 15.7.4 and 15.7.6, respectively. The radiological consequence analyses of these events were based on SRP Section 15.7.4 and Regulatory Guide (RG) 1.25, and the licensee demonstrated that the resulting radiological consequences met the relevant dose acceptance criteria given in the SRP.

In its radiological consequences analyses of current FHAs in the GGNS UFSAR, the licensee assumed the operation of certain ESF systems such as secondary containment integrity, isolation of the containment and fuel handling area ventilation systems, and operation of the Standby Gas Treatment System. In this license amendment request, the licensee reassessed the radiological consequences resulting from the FHAs without crediting operation of the ESF systems, and concluded that the GGNS design still provides reasonable assurance that the radiological consequences resulting from the FHA during the reactor operational Modes 4 and 5 will be within the dose acceptance criteria given in the SRP.

Significant factors incorporated in the licensee's FHA reanalysis include:

1. Taking no credit for containment structure integrity or for operability of the ESF systems that are currently credited in mitigating the consequences of the FHA.

2. Using a longer fission product decay period of 8 days (time period from the reactor shutdown to the first fuel movement). This decay period is defined in terms of "recently irradiated fuel" in the LCOs and further defined in the Bases for each of the affected TSs as "fuel that has occupied part of critical reactor core within the previous 8 days."

3. Using updated atmospheric dispersion factors (χ/Q values).

4. Incorporating dose conversion factors given in Federal Guidance Reports 11 and 12.

The staff has reviewed the licensee's analysis and finds that the analytical methods used for the radiological consequence assessment are acceptable, and that the radiological consequences calculated by the licensee meet the relevant dose acceptance criteria. The radiological consequence results from the licensee's FHA are listed in Table 1 of this Safety Evaluation (SE).

To verify the licensee's assessment, the staff calculated confirmatory radiological consequences. The major parameters and assumptions used by the staff are listed in Table 2 of this SE, and the radiological consequence results calculated by the staff are given in Table 1 of this SE along with those calculated by the licensee. The radiological consequences calculated by the staff are consistent with those calculated by the licensee.

The staff's evaluation of the licensee's FHA concludes that the doses calculated by the licensee and by the staff are less than 25 percent of the exposure guideline values given in 10 CFR Part 100 and meet the acceptance dose criteria specified in SRP 15.7.4. The dose to the control room operator calculated by the licensee and by the staff are within the acceptable dose criterion given in the SRP and General Design Criterion 19 of Appendix A to 10 CFR Part 50. Therefore, the staff concludes that the radiological consequences analyzed and submitted by the licensee are acceptable.

On the basis of this evaluation, the staff concludes that the license amendment requested by the licensee to revise the operability requirements for FHA mitigating systems during reactor operational Modes 4 and 5 not involving recently irradiated fuel is acceptable. The administrative change requesting deletion of the one-time-only exception to Operating License Condition 2.C(2), granted by Amendment 129, is also acceptable.

TABLE 1

Radiological Consequences for Fuel Handling Accident (rem)

	GGNS		NRC	
	Thyroid	Whole Body	Thyroid	Whole Body
Exclusion Area Boundary	74.2	0.16	63	<1
Control Room	29.1	2.4E-2	25	<1

Dose Acceptance Criteria:

Exclusion Area Boundary	75 rem thyroid and 6 rem whole body
Control Room	30 rem thyroid and 5 rem whole body

Table 2
Parameters and Assumptions Used in
Radiological Consequence Calculations
Fuel Handling Accident

Parameter	Value
Reactor power	3910 MWt
Radial peaking factor	1.7
Fission product decay period	192 hours
Number of fuel rods damaged	98 (1 fuel assembly)
Total number of fuel rods in core	56000
Fuel pool water depth (above the fuel)	23 ft
Fuel gap fission product inventory	
Noble gases excluding Kr-85	10%
Kr-85	30%
Iodine except I-131	10%
I-131	12%
Fuel pool decontamination factors	
Iodine	100
Noble gases	1
Control room	
Unfiltered infiltration	610 cfm
Recirculation flow through charcoal adsorber	4,000 cfm
Charcoal adsorber iodine removal efficiency	95%
Iodine Protection factor	7.2
Atmospheric relative concentrations (χ/Q values)	
Exclusion area boundary (0 to 2 hours)	9.56E-4 sec/m^3
Control room	2.75E-3 sec/m^3
Duration of accident	2 hours
Fission product release mode	Puff release
Computer code used in dose calculation	ACTICODE
Dose conversion factors	FGR 11 and 12

3.2 Shutdown Safety Controls

The area of review under shutdown safety controls focused on (1) procedures to assess the impact of removing systems from service during shutdown conditions, (2) the ability to implement prompt methods to close both the Primary Containment and the Secondary Containment in the event of an FHA, and (3) controls to avoid unmonitored releases.

In the licensee's submittal of June 23, 1999, it referenced Section 4.5 of NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management." NUMARC 91-06 focused on events involving loss of decay heat removal and addressed the ability to promptly restore containment integrity. It identified that the time to effect closure should be consistent with plant conditions (e.g., reactor coolant inventory and decay heat load). In this regard, the licensee developed administrative controls for the closure of the Primary Containment and the Secondary Containment, which were based on the recommendations of NUMARC 91-06, Section 4.5.

Subsequent to the development of NUMARC 91-06, the staff completed its activities associated with the shutdown rulemaking. The shutdown rulemaking did not result in any additional TSs during shutdown conditions. With regard to NRC concerns over removal of significant systems from service during plant shutdowns, the Commission directed the staff to address these concerns by placing new limitations in the maintenance rule (i.e., 10 CFR 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants"). The proposed change to 10 CFR 50.65 would require licensees to assess the impact on shutdown safety before removing equipment from service for maintenance.

The industry, through the Nuclear Energy Institute, has been developing guidance to implement this Commission directive. A revised draft of NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," was submitted to the NRC on July 1, 1998. While NUMARC 91-06 only focused on selected shutdown operations, NUMARC 93-01 addressed a broad scope of activities during shutdown conditions.

In the draft NUMARC 93-01 guideline, Section 11.2.6, "Safety Assessment for Removal of Equipment from Service During Shutdown Conditions," under the subheading of "Containment - Primary (PWR)/Secondary (BWR)," the following guidance is provided:

> ...for plants which obtain amendments to modify Technical Specification requirements on primary or secondary containment operability and ventilation system operability during fuel handling or core alterations, the following guidelines should be included in the assessment of systems removed from service:
>
> During fuel handling/core alterations, ventilation system and radiation monitor availability (as defined in NUMARC 91-06) should be assessed, with respect to filtration and monitoring of releases from the fuel. Following shutdown, radioactivity in the fuel decays away fairly rapidly. The basis of the Technical Specification operability amendment is the reduction in doses due to such decay. The goal of maintaining ventilation system and radiation monitor availability is to reduce doses even further below that provided by the natural decay.

A single normal or contingency method to promptly close primary or secondary containment penetrations should be developed. Such prompt methods need not completely block the penetration or be capable of resisting pressure.

The purpose of the "prompt methods" mentioned above is to enable ventilation systems to draw the release from a postulated fuel handling accident in the proper direction such that it can be treated and monitored.

The draft NUMARC 93-01 guidance is built upon two basic premises: avoiding unmonitored releases and using available (although not necessarily "Technical Specification OPERABLE") filtration capabilities to reduce doses below those achieved from the decay of the source term, and the scrubbing of the water. Until such time as NUMARC 93-01 is endorsed as a formal industry position, the licensee has committed to the above draft wording for controlling the removal from service of systems, structures, and components that are currently required by TSs during periods of core alteration/fuel handling.

In response to its commitment to NUMARC 93-01, the licensee has committed to updating its administrative controls for Primary Containment/Secondary Containment closure. Areas addressed in these administrative controls include the following:

- Establishment of contingency plans to provide for immediate closure of external openings through the secondary containment, including the roll-up door, if in use.

- Tracking of all openings through the containment structure developed by work evolutions on various systems.

- Establishment of procedures for closure of containment isolation valves opened during outage work evolutions.

- Major disassembly of containment boundary valves, except those valves 3/4-inch or less, should only be performed on one valve at a time with administrative controls established on the opposite boundary valve. If conditions require working both containment isolation valves in parallel, closure devices shall be fabricated and staged at the work area.

- Major ventilation and air conditioning systems, including radiation release monitoring, shall be available. The GGNS reanalysis of the Fuel Handling Accident credits the operation of the Control Room Fresh Air System. As a result, the operability requirement for both the Control Room Fresh Air System and the Control Room Air Conditioning System during fuel handling are maintained.

- Maintain availability of at least one train of the Standby Gas Treatment System to provide for a forced air filtered release path.

- Personnel responsible for Primary Containment/Secondary Containment closure shall be trained and knowledgeable in using procedures for reestablishing building integrity.

The staff has reviewed the proposed updates of the licensee's administrative procedures on closure and concludes that they provide reasonable and adequate controls to achieve Primary Containment/Secondary Containment closure.[3]

In accordance with regulatory requirements, the licensee must develop procedures to maintain control of radioactive effluents and to maintain doses to members of the public from radioactive effluents as low as reasonably achievable. The licensee's program for these requirements are described in TS 5.5.4, "Radioactive Effluent Controls Program." The staff notes that the licensee's Radioactive Effluent Controls Program is not impacted by these proposed TS changes and, therefore, a situation will not occur that could result in an unmonitored release.

The staff considers the licensee's described administrative controls as an adequate means to control monitoring and filtration of any releases that might occur from an FHA, and to be consistent with the Commission's December 11, 1997, instructions to the staff. Therefore, the staff concludes that the licensee's shutdown safety controls for building integrity and ventilation/filtration systems is an acceptable means of supporting the proposed TS changes.

3.3 Risk Evaluation

There have been several occurrences in the history of the nuclear power industry in which a fuel bundle has actually been dropped in the course of fuel handling activities. In each of these instances, the actual releases from the fuel have been minimal or nonexistent (reference NSAC/129 and other subsequent plant operating event reports). This has shown that the assumptions utilized in the radiological dose calculations for an FHA are quite conservative.

An examination of the significance of the FHA was examined as part of a GGNS shutdown risk study (reference NRC Meeting Summary of September 9, 1998, "Meeting To Discuss The Planned Joint Proposals On Containment Requirements To Mitigate Fuel Handling Accidents During Refueling" with several BWR/6 plants). Insights from this study show that due to the much lower potential releases from an FHA than from a core damage accident (approximately 100 Curies as compared to 3 $X10^6$ Curies) the risk from an FHA is very low, and is three orders of magnitude below the risk associated with a core damage event during shutdown.

The staff has reviewed the licensee's risk-informed discussion and supports the proposed license amendment for the following reasons:

- Results of agency-sponsored probabilistic risk assessment studies for GGNS indicate that during shutdown the potential for core damage is least when the reactor vessel head is off (thus, alleviating concerns regarding overpressurization of shutdown cooling system components), and the vessel water level is raised (thereby providing more time for mitigation of accident initiating events). During refueling activities when fuel movement is taking place, TSs require a minimum water level of 22 feet 8 inches of water above the active core. This is the case of the plant operating state associated with fuel handling during refueling outages.

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[3]Reasonable and adequate controls means an integral barrier or controlled filtration can be provided in time to control a significant release of radioactive material and to achieve an adequate means to control monitoring of releases.

- There are no TSs requiring containment integrity during shutdown other than the one involving fuel handling (even though the risk associated with some of these plant operating states is higher). Furthermore, no such TSs were proposed to address core damage related concerns raised during the shutdown rulemaking process.

- GGNS has outage management administrative controls for reestablishing containment closure consistent with plant conditions.

- Increases in core damage frequency and large early release frequency, associated with the proposed change, would most likely be considerably less than 1E-6/yr and 1E-7/yr, respectively. Such increases are insignificant according to guidance provided in RG 1.174.

3.4 Summary

The proposed TS changes redefine the fuel handling requirements in two areas, given the longer decay period from the time of reactor subcriticality:

- Requirements associated with INTEGRITY for the Primary Containment and Secondary Containment are relaxed (since no credit is taken for these in the new analysis for mitigation of an FHA).

- Requirements for selected ESF systems (those that are not credited in the new analysis for mitigation of an FHA).

The proposed changes do not impact TS requirements for systems needed to prevent or mitigate CORE ALTERATION events other than the FHA. They also do not change the requirements for systems needed to mitigate potential vessel draindown events, systems needed for decay heat removal, or the requirements to maintain high water levels over irradiated fuel.

As previously discussed in this SE, the staff finds the proposed TS changes acceptable because:

- Fuel handling accidents are not risk-significant and have not merited individual TS controls.

- Adequate defense-in-depth is maintained by the requirements for water level and the natural decay of irradiated fuel.

- The control room and offsite-dose calculations meet the acceptance criterion without reliance on building integrity or FHA mitigating systems.

- Administrative controls over shutdown safety that ensure containment closure, should it be needed, and to control monitoring and filtration of any releases that might occur from an FHA are in effect.

- Risk-informed considerations support the licensee's proposed TS changes.

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 (64 FR 46435 dated August 25, 1999). 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.

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Date: October 20, 1999