Mr. Joseph J. Hagan
Vice President, Operations GGNS
Entergy Operations, Inc.
P. O. Box 756
Port Gibson, MS 39150

SUBJECT: EXEMPTION FROM CRITICALITY ACCIDENT REQUIREMENTS IN 10 CFR 70.24(a) - GRAND GULF NUCLEAR STATION, UNIT 1 (TAC NO. M96177)

Dear Mr. Hagan:

The enclosed exemption, as requested in your application dated July 15, 1996, (GNRO-96/00082), and supplemented by letters dated March 7 and April 29, 1997, (GNRO-97/00021 and 00035), is from the criticality monitoring requirements of 10 CFR 70.24(a), "Criticality Accident Requirements." The exemption concerns the storage of special nuclear material (SNM) in the form of (1) in-core nuclear instrumentation (e.g., source range monitors) when not in use and (2) unirradiated fuel. For unirradiated fuel, the exemption was requested for unirradiated fuel that is packaged in accordance with 10 CFR Part 71, "Packaging and Transportation of Radioactive Material," while the fuel is taken from the shipping trucks to the spent fuel pool area to be removed from the packaging, and for unirradiated fuel that is stored in the new fuel vault (NFV). For this exemption, you have committed to have (1) the total quantity of SNM present in the nuclear instrumentation less than a critical mass and (2) the unirradiated fuel is only removed from the Part 71 packaging in areas where a criticality accident monitor system is in use. As stated in the letter dated March 7, 1997, you have administrative controls to prevent optimum moderation of the unirradiated fuel in the NFV.

The Commission has granted this Exemption pursuant to 10 CFR 70.14. A copy of the Exemption is being forwarded to the Office of the Federal Register for publication. In granting this exemption, the staff is relying on the above two commitments.

Sincerely, 10/31/97

Jack N. Donohew, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-416

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Enclosure: Exemption

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*See previous concurrence
Document Name: GG96177.EXE
SRXB Memo dated: March 11, 1997

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COPY	YES/NO	YES/NO	YES/NO	YES/NO	YES/NO	

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COPY	YES/NO	YES/NO	YES/NO

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

October 31, 1997

Mr. Joseph J. Hagan
Vice President, Operations GGNS
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Jack N. Donohew, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-416

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7590-01-P

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	Docket No. 50-416
ENTERGY OPERATIONS, INC.	)	
SYSTEM ENERGY RESOURCES, INC.	)	
SOUTH MISSISSIPPI ELECTRIC POWER ASSOCIATION	)	
ENTERGY MISSISSIPPI, INC.	)	
	)	
(Grand Gulf Nuclear Station, Unit 1)	)	
	)	

EXEMPTION

I.

Entergy Operations, Inc. (the licensee) is the holder of Facility Operating License No. NPF-29, which authorizes operation of Grand Gulf Nuclear Station, Unit 1 (GGNS). The operating license provides, among other things, that the licensee is subject to all rules, regulations, and orders of the Nuclear Regulatory Commission (NRC or the Commission) now and hereafter in effect.

The facility is a General Electric boiling water reactor at the licensee's site in Claiborne County, Mississippi.

II.

Title 10 CFR 70.24, "Criticality Accident Requirements," paragraph (a) states, in part, that "Each licensee authorized to possess special nuclear material [SNM] in a quantity exceeding 700 grams of contained uranium-235, 520 grams of contained uranium-233, 450 grams of plutonium, 1,500 grams of

contained uranium-235 if no uranium enriched to more than 4 percent by weight of uranium-235 is present, 450 grams of any combination thereof, or one-half such quantities if massive moderators or reflectors made of graphite, heavy water or beryllium may be present, shall maintain in each area in which such licensed special nuclear material is handled, used, or stored, a monitoring system meeting the requirements of [10 CFR 70.24](a)(1) or (a)(2), as appropriate, and using gamma- or neutron-sensitive radiation detectors which will energize clearly audible alarm signals if accidental criticality occurs. This section is not intended to require underwater monitoring when special nuclear material is handled or stored beneath water shielding or to require monitoring systems when special nuclear material is being transported when packaged in accordance with the requirements of Part 71 [(i.e., 10 CFR Part 71, "Packaging and Transportation of Radioactive Material,")] of this chapter."

The licensee meets the quantity criteria in 10 CFR 70.24(a) and is, therefore, required to have a criticality accident monitoring system in each area in which SNM in any form is handled, used, or stored. The licensee has proposed an exemption to this requirement for the storage of two forms of SNM at the site: (1) not-in-use in-core nuclear instrumentation (e.g., source range monitors) and (2) onsite unirradiated fuel. For the unirradiated fuel, the exemption is requested for the following cases:

- The interval when the fuel, packaged for shipment to the site in accordance with 10 CFR Part 71, is taken from the shipping truck to the plant area where the Part 71 packaging is removed.

- The storage of the unirradiated fuel in the new fuel vault (NFV), instead of the spent fuel pool, after the packaging is removed.

The very small quantity of SNM present in the nuclear instrumentation is in the form of thin coatings within the instrumentation and the unirradiated fuel assemblies would only be removed from the NRC-approved packaging in areas where criticality monitors are in use, and stored in either the NFV or the spent fuel pool. The unirradiated fuel that is stored in the spent fuel pool would be monitored in accordance with 10 CFR 70.24(a), whereas there is not a criticality accident monitor in the NFV.

An exemption from 10 CFR 70.24(a) is required for the licensee to store SNM at the site and not have a criticality accident monitoring system for the storage areas.

III.

Pursuant to 10 CFR 70.14, "Specific exemptions," the Commission may, upon application of any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security, and are otherwise in the public interest.

Pursuant to 10 CFR 70.24(d), any licensee who believes that good cause exists why it should be granted an exemption in whole or in part from the requirements of this section may apply to the Commission for such an exemption. Such application shall specify the reason for the relief requested.

By letter dated July 15, 1996, as supplemented by letters dated March 7 and April 29, 1997, the licensee requested an exemption from the monitoring requirements of 10 CFR 70.24(a) for the storage of these two forms of SNM at the site. In those letters, the licensee provided the justification and reasons for requesting the exemption. The licensee did not request an exemption to the performance requirements of a criticality accident monitoring system that are specified in 10 CFR 70.24(a)(1) or (a)(2).

A previous exemption from the provisions of 10 CFR 70.24 for the storage of SNM was granted for GGNS in the July 15, 1981, SNM License No. 1882. This exemption expired with the SNM license when the operating license was issued for GGNS because the exemption was not reissued at that time. Therefore, the licensee has requested an exemption from the criticality accident monitoring requirements of 10 CFR 70.24(a) specifically for the areas containing in-core instrumentation detectors (which are not in use) and unirradiated (fresh) fuel. For unirradiated fuel, the exemption is requested for the unirradiated fuel that is in NRC-approved packaging while the fuel is taken from the shipping trucks to the spent fuel pool area to be removed from the packaging, and for the unirradiated fuel that is stored in the NFV, instead of the spent fuel pool.

The principal form of SNM at GGNS is in the form of nuclear fuel. Other quantities of SNM are also used or stored at the facility in the form of fissile material incorporated into in-core nuclear instrumentation (e.g., source range monitors, intermediate range monitors, local power range monitors, and traversing in-core probes). The instrumentation is being stored

at the site within the security fence in different plant areas.

The SNM in the nuclear instrumentation is in small quantities in thin coatings applied to the inside of sealed fission chambers contained within the instruments. The licensee has stated that the total amount of SNM contained in the nuclear instruments meets the "forms not sufficient to form a critical mass" in Section 1.1 of Regulatory Guide 10.3, "Guide for the Preparation of Applications for Special Nuclear Material Licenses of Less Than Critical Mass Quantities," Revision 1, dated April 1977. Thus, the licensee has committed that the total amount of SNM contained within in-core nuclear instrumentation will be less than a critical mass. Therefore, the small quantity of SNM in the nuclear instrumentation precludes inadvertent criticality.

Unirradiated nuclear fuel is received at the site only in NRC-approved Part 71 packaging. The entire Part 71 packaging consists of two right rectangular boxes consisting of an outer wooden container surrounding a inner metal container housing the unirradiated fuel. There is only cushioning material between the two boxes. The containers are designed in accordance with a certificate of compliance for radioactive materials packages issued by the NRC, in this case for the shipment of unirradiated fuel assemblies. It is the inner metal container that ensures that a geometrically safe configuration of the fuel is maintained during transport, handling, storage, and accident conditions, and that the introduction of any moderating agents to the fuel is precluded due to its leak-tight construction. Criticality is precluded due to the construction of the package and the storage configuration of the fuel in the package. This is based on a criticality analysis of the Part 71 packaging which limits the number of such packages on a shipping truck.

The handling of unirradiated fuel at the site is governed by administrative and departmental procedures that specify New Fuel Processing and Criticality Rules to ensure that fuel is not inadvertently removed from the inner metal container until it is positioned in the fuel inspection area near the spent fuel pool of the auxiliary building where a criticality accident monitoring system meeting 70.24(a) is present. It is the metal container that is referred to when the licensee stated that the unirradiated fuel will only be removed from the NRC-approved packaging in the presence of a criticality accident monitoring system meeting 70.24(a).

The unirradiated fuel is brought onsite on shipping trucks. The wooden containers are removed from the inner metal containers, and the unirradiated fuel is lifted in the metal container to the 208-foot level of the auxiliary building, and adjacent to the cask washdown pit and NFV of the spent fuel pool area. Only one metal container is lifted at a time, and the crane and lifting equipment used for the lift are certified. The plant areas that the metal containers would be moved through were inspected during a visit to the site and it was determined that the areas have drains to prevent the possibility of submerging the metal containers under water and creating a possible criticality condition. The only practical plant area where the new fuel could be submerged in water to introduce moderation is the spent fuel pool and there are 70.24(a) monitors in that area.

In the spent fuel pool area, the fuel is removed from the containers, inspected and channeled, and then placed either in the spent fuel pool or the NFV. Currently the unirradiated fuel is placed only in the spent fuel pool and, while the fuel is in the spent fuel pool, it is monitored by a 70.24(a)

monitoring system; however unirradiated fuel may be stored inside the NFV and there is not a criticality accident monitor in the NFV. The design basis criticality margin requirements for the NFV is to maintain the unirradiated fuel in the vault at a subcriticality margin of at least 0.05 (i.e., a k effective no more than 0.95). The new fuel would be stored in racks that are designed to withstand all credible static and dynamic loadings to prevent damage and distortion of the racks, and to maintain the design subcriticality margin of 0.05 whether the vault is dry or flooded with unborated water, because unborated water would moderate the fuel and reduce the subcriticality margin. The racks are constructed in accordance with the quality assurance requirements of Appendix B to 10 CFR Part 50 and are categorized as Safety Class 2 and Seismic Category I. The vault is in a concrete, Seismic Category I building that is designed to Regulatory Guides 1.13 and 1.29 which precludes the deleterious effects on the fuel in the NFV by natural phenomena such as earthquakes, tornados, hurricanes, tornado missiles, and floods. To prevent water moderation, there is a drain at the low point of the vault to remove water in the vault to prevent accumulation of water within the NFV and no fuel is placed in the vault if there is water in the vault. The licensee also has procedures to prevent the introduction of an optimum moderation inside the vault (e.g., using pressurized water fire extinguishers instead of foam for combating fires around fuel) which could decrease the subcriticality margin to a value greater than the design value of 0.05. Although the Technical Specifications for Grand Gulf do not specifically limit the enrichment of the fuel onsite including the NFV, the k-effective for spent fuel or new fuel in the fuel racks and submerged in water is limited to 0.95 by the Technical

Specifications and the enrichment of the fuel onsite is limited because the k-effective for the NFV is not allowed to be greater than 0.95. The fuel enrichment is a contributor to the value of k-effective. Therefore, the design of the NFV will preclude inadvertent criticality of the new fuel in the vault.

Therefore, based on the licensee's letters and the staff's evaluation, the Commission concludes that good cause exists for granting an exemption to the criticality monitoring requirements of 10 CFR 70.24(a) in storage areas for (1) in-core instrumentation detectors which are not in use and (2) unirradiated fuel stored in the NFV. Based on the information provided by the licensee, there is reasonable assurance that the nuclear instrumentation and unirradiated fuel will remain subcritical during handling and storage in areas where critically accident monitors required by 10 CFR 70.24(a) are not present. Additionally, all fuel storage and handling areas will continue to be monitored to detect conditions that may result in excessive radiation levels as required by General Design Criterion 63.

IV.

For the foregoing reasons, pursuant to 10 CFR 70.24(d), the NRC staff has determined that good cause has been shown for granting an exemption to the criticality monitoring requirements of 10 CFR 70.24(a).

Accordingly, the Commission has determined that, pursuant to 10 CFR 70.14, an exemption is authorized by law, will not endanger life or property or common defense and security, and is otherwise in the public interest. Therefore, with the total amount of SNM contained in the in-core

nuclear instruments less than a critical mass, as defined by Section 1.1 of Regulatory Guide 10.3 (Revision 1, dated April 1977), with the unirradiated fuel assemblies only removed from the NRC-approved metal containers in areas where criticality monitors are present, and with administrative controls to prevent optimum moderation of the unirradiated fuel in the NFV, the Commission hereby grants Entergy Operations, Inc. an exemption from the criticality monitoring requirements of 10 CFR 70.24(a) for the storage of not-in-use in-core nuclear instrumentation and of unirradiated fuel in the NFV.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will have no significant impact on the quality of the human environment (62 FR 55837). This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 31st day of October 1997.

FOR THE NUCLEAR REGULATORY COMMISSION

Samuel J. Collins, Director
Office of Nuclear Reactor Regulation