

Mr. Joseph J. Hagan
 Vice President, Operations GGNS
 Entergy Operations, Inc.
 P. O. Box 756
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April 1, 1997

SUBJECT: ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT FOR
 GRAND GULF NUCLEAR STATION, UNIT 1 (TAC NO. M92993)

Dear Mr. Hagan:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact related to your application of July 21, 1995, to extend the expiration date of full-power Facility Operating License No. NPF-29 for Unit 1. The proposed amendment would extend the expiration date of the license from June 16, 2022, to November 1, 2024.

The assessment is being forwarded to the Office of the Federal Register for publication.

Sincerely,

Original signed by

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

Enclosure: Environmental Assessment

cc w/encl: See next page

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

April 11, 1997

Mr. Joseph J. Hagan
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Sincerely,

A handwritten signature in black ink, appearing to read "Jack N. Donohew".

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

Enclosure: Environmental Assessment

cc w/encl: See next page

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Grand Gulf Nuclear Station

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UNITED STATES NUCLEAR REGULATORY COMMISSIONENERGY OPERATIONS, INC.SYSTEM ENERGY RESOURCES, INC.SOUTH MISSISSIPPI ELECTRIC POWER ASSOCIATIONENERGY MISSISSIPPI, INC.DOCKET NO. 50-416GRAND GULF NUCLEAR STATION, UNIT 1ENVIRONMENTAL ASSESSMENT AND FINDING OFNO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (the Commission) is considering the issuance of an amendment to Facility Operating License No. NPF-29, issued to Entergy Operations, Inc. (the licensee), for operation of the Grand Gulf Nuclear Station, Unit 1 (GGNS), located in Claiborne County, Mississippi.

ENVIRONMENTAL ASSESSMENTIdentification of the Proposed Action:

GGNS is currently licensed to operate until June 16, 2022, which is 40 years from the issuance of the low-power license on June 16, 1982. The proposed action would extend the expiration date of the operating license from June 16, 2022, to November 1, 2024. The extended date under consideration would be 40 years after the full-power licensee was issued on November 1, 1984.

The proposed action is in accordance with the licensee's application for amendment dated July 21, 1995.

The Need for the Proposed Action:

The proposed action would allow the licensee to operate GGNS until November 1, 2024. This would allow the licensee to recapture approximately

2.5 years of low-power operation from June 16, 1982, to November 1, 1984, which was an unusually long period for low-power operation. For the low-power license, the licensee was only authorized to operate the plant up to 5 percent of rated power or 191 megawatts thermal. On August 31, 1984, the Commission amended the low-power license to allow the licensee to operate up to 100 percent rated power or 3833 megawatts thermal. However, in response to a court challenge to the amendment, the Commission issued CLI-84-19 on October 25, 1984, directing the Staff to issue a separate full power license to GGNS. This action by the Commission prevented the licensee from operating GGNS at full power. On November 1, 1984, a full power license was issued to GGNS whose expiration date was 40 years from the date of issuance of the low power license. In the full-power license, the licensee was authorized to operate up to 100 percent of rated power.

Therefore, this proposed action would allow the licensee to operate GGNS for approximately two additional operating cycles before the plant would be shut down for the expiration of the operating license. The licensee stated that the benefits of the proposed action were the following:

- Reduction in the need for buying replacement power, because of operating GGNS, on the order of \$120 million using current estimates;
- Additional flexibility in long-range planning by the licensee and a savings in excess of \$100,000 in construction costs;
- Deferral of additional system construction;
- Delayed application for license renewal under 10 CFR Part 54 until the process has been implemented;
- Compatibility with projected refueling outage schedules for GGNS.

Environmental Impacts of the Proposed Action:

The Commission has completed its evaluation of the proposed action and concludes that there are no significant environmental considerations involved with the proposed action. The extension of the operating license does not affect the design or operation of the plant, does not involve any modifications to the plant or any increase in the licensed power for the plant, and will not create any new or unreviewed environmental impacts that were not considered in the Final Environmental Statement (FES) related to the operation of GGNS, NUREG-0777, dated September 1981. The evaluations presented in the FES were the environmental impacts of generating power at GGNS and the basis for granting a 40-year operating license for GGNS. The environmental impacts of the proposed action are based on the evaluations in the FES. The FES also considered the environmental impacts of operating both Unit 1 and Unit 2; however, Unit 2 was abandoned in 1985 and was never completed.

Although the FES considered a specific operating period of 30 years for GGNS, the staff concluded in the full-power license issued on November 1, 1984, that the environmental impacts associated with a 40-year operating period were sufficiently addressed in the FES. This was based on a consideration of the FES which in general, assesses various impacts associated with operation of the facility in terms of annual impacts and balances these against the anticipated annual energy production benefits. Thus, the overall assessment and conclusions would not be dependent on a specific operating life. There are, however, three areas in which a specific operating life was assumed:

1. Project costs are based on a 30-year levelized cost.
2. Radiological assessments are based on a 15-year plant midlife.
3. Uranium fuel cycle impacts are based on one initial core load and annual refuelings.

These were assessed by the staff to determine whether the use of a 40-year operating period rather than a 30-year operating period would significantly affect the staff's assessment concerning these areas.

1. Projected Costs

The projected costs of the facility which includes the cost of decommissioning are based on a 30-year operating life and are levelized over that period of time. The use of a 40-year operating period rather than a 30-year period would not significantly affect the operating and maintenance cost. If the facility's capital cost were spread over a 40-year period, the overall resulting cost of facility operation would be lowered. Therefore, any extension in the operating life of the facility would result in savings in system production costs. The production of energy at reduced cost results in an incremental net benefit for the use of a 40-year operating life of the facility.

2. Radiological Assessments

The NRC staff calculates dose commitments to the human population residing around nuclear power reactors to assess the impact on people from radioactive material released from these reactors. The annual dose commitment is calculated to be the dose that would be received over a 50-year period following the intake of radioactivity for 1 year under the conditions that would exist 15 years after the plant began operation.

The 15-year period is chosen as representing the midpoint of plant operation and factors into the dose models by allowing for buildup of long life radionuclides in the soil. It affects the estimated doses only for radionuclides ingested by humans that have half-lives greater than a few years. For a plant licensed for 40 years, increasing the buildup period from 15 to 20 years would increase the dose from long life radionuclides via the ingestion pathways by 33% at most. It would have much less effect on dose from shorter life radionuclides. Tables D-4 and D-5 of Appendix D to the FES indicate that the estimated doses via the ingestion pathways are only a fraction of the regulatory design objectives. For example, the ingestion dose to the thyroid is 7.0 mrem/yr compared to an Appendix I design objective of 15 mrem/yr. Thus, for 7 mrem/yr, an increase of even as much as 33% in these pathways results in a dose within the Appendix I guidelines and would still not be significant.

3. Uranium Fuel Cycle Impacts

The impacts of the uranium fuel cycle are based on 30 years of operation of a model light water reactor (LWR). The fuel requirements for the model LWR were assumed to be one initial core load and 29 annual refuelings (approximately 1/3 core). The annual fuel requirements for the model LWR averaged out over a 40-year operating life (1 initial core and 39 refuelings of approximately 1/3 core) would be reduced slightly as compared to the annual fuel requirement averaged for a 30-year operating life.

The net result would be an approximately 1.5% reduction in the annual fuel requirement for the model LWR. This small reduction in fuel requirements would not lead to significant changes in the impacts of the

uranium fuel cycle. The staff does not believe that there would be any changes to Grand Gulf FES Table 5.10 (S-3) that would be necessary in order to consider 40 years of operation. If anything, the values in Table 5.10 become more conservative when a 40-year period of operation is considered.

The staff has concluded, based on the reasons discussed above, that the impacts associated with a 40-year operating license duration are not significantly different from those associated with a 30-year operating license duration assessed in the Grand Gulf FES. Therefore, the staff concluded that the Grand Gulf FES sufficiently addresses the environmental impacts associated with a 40-year operating period.

The considerations involved in completing the Commission's evaluation for the proposed action are discussed below.

1. Radiological Impacts of Design Basis Accidents

The offsite exposure from releases during postulated accidents has been previously evaluated in the Updated Final Safety Analysis Report (UFSAR) for GGNS. The results are acceptable when compared with the criteria defined in 10 CFR Part 100, as documented in the Commission's Safety Evaluation Report, NUREG-0831, dated September 1981, and its seven supplements.

This conservative design-basis evaluation is a function of four parameters: (1) the type of accident postulated, (2) the radioactivity calculated to be released during the accident, (3) the assumed meteorological conditions at the site, and (4) the population distribution versus distance from the plant. An environmental assessment of accidents is also provided in

Section 5.9.2 of the FES. The type of accidents and the calculated radioactivity released do not change with the proposed action. The site meteorology as defined in Chapter 2 of the UFSAR is essentially constant. The Commission staff has concluded that the population size and distribution is the only parameter in the accident analyses that is considered to change for the proposed action.

The licensee presented information on the population distribution in the general vicinity of GGNS as new data from the 1980 and 1990 census compared to the data presented also in Chapter 2 of the UFSAR. The 1980 and 1990 census show a general reduction in the near site population (up to 10 miles) and in Mississippi communities and population centers within 50 miles of the site. Because of the general reduction in population near the site and the short 2.5 years that the license is proposed to be extended, the staff concludes that the proposed action will not significantly change previous conclusions on the potential environmental of offsite releases from postulated accidents.

2. Radiological Impacts of Annual Releases

The annual occupational exposure of workers at the plant, station employees and contractors, is reported in the Annual Operating Report for GGNS submitted by the licensee. For 1989 through 1995, the annual exposure has been measured at values between 56 and 484 person-rem, with the average annual exposure over 7 years being 327 person-rem. The lowest exposure value is for a year without a refueling outage and the highest value is for a year with a refueling outage. In Section 5.9.1.1.1 of the FES, the average occupational exposure for a boiling water reactor, as is GGNS, was reported as

740 person-rem. Therefore, the expected annual occupational exposure for the proposed extended period of operation does not change previous conclusions presented in the FES on occupational exposure.

The offsite exposure from releases during routine operations has been previously evaluated in Section 5.9.1 of the FES. During the low-power license up to August 31, 1984, the plant was restricted to no more than 5 percent of rated power and the generation of radioactivity at the plant was significantly smaller than would have occurred if the plant was at full-power operation. The licensee provided in its application the annual public dose from releases of radioactive materials in gaseous and liquid effluents from GGNS for 1987 through 1994. These doses for 1995 were reported in the 1995 Annual Radioactive Effluent Release Report which was submitted in the licensee's letter of May 2, 1996. These doses were a small fraction of the dose design objectives of Appendix I to 10 CFR Part 50 which were the estimates of doses to the public that the FES was based on. The average of the 9 years was less than 10 percent of the Appendix I values. Therefore, the additional 2.5 years of operation that the licensee has requested does not change previous conclusions presented in the FES on annual public doses.

3. Environmental Impact of the Uranium Fuel Cycle

In addition to the impacts associated with the operation of the plant, there are impacts associated with the uranium fuel cycle. The uranium fuel cycle includes those facilities and processes (e.g., uranium mills, fuel fabrication plants, and fuel enrichment facilities) that are necessary to

support the operation of the plant by providing the fuel for the reactor. Section 5.10 of the FES described the impacts associated with the fuel cycle for GGNS.

The operation of the plant from June 16, 1982, to November 1, 1984, did not consume sufficient fuel to require the licensee to use any more fuel than was expected in the estimate for 40 years of operations. If the plant had operated at the maximum power level allowed by the low-power license from June 16, 1982, to November 1, 1984, the impact on fuel of this operation would be less than 1 percent of that for the 40 years of operation at 100 percent power which is allowed by the full-power license. Therefore, the proposed action does not change the estimates of the impacts of the fuel cycle that were presented in the FES.

4. Transportation of Fuel and Radioactive Waste

The environmental impacts of transportation of fuel to and from the site and the transportation of solid radioactive wastes from the site to a waste burial grounds were considered in Table 5.3 of the FES. Because the proposed action should not change the amount of fuel that is expected to be used in 40 years of operations, the impacts in the FES associated with the transportation of fuel should not change due to the proposed action.

The licensee provides the amount of solid radioactive wastes shipped from the site in its annual (after 1992) and semi-annual (up through 1992) radioactive effluent release reports. In these reports for 1991 through 1995, the average amount of solid radioactive wastes shipped for these 5 years was 46 truck shipments of less than 190 cubic meters per year. This is less than

the annual impact reported in the FES for transportation of solid radioactive wastes; therefore, the proposed action should not exceed the environmental impacts given in the FES.

5. Nonradiological Impacts

The staff has reevaluated the non-radiological impacts associated with the operation of the plant for the proposed action. The non-radiological impacts, primarily on water and land use, are shown in the FES to be minor. The major non-radiological impact is the concentrations in and the temperature of the water discharged from the plant to the nearby Mississippi River. The plant makeup and service water is supplied by a series of radial collector wells located in the floodplain parallel to the Mississippi, as described in Section 2.4 of the UFSAR and Section 4.2.3 of the FES. The wells are cylindrical concrete caissons sunk into the alluvial aquifer adjacent to the Mississippi River with perforated pipes projecting horizontally into the aquifer, which draw water from the aquifer and the Mississippi River. The cooling of water for power generation is provided by a cooling tower. The water discharged from the plant to the Mississippi River is the cooling tower blowdown from the cooling tower basin to maintain water quality.

As explained in Section 5.6 of the FES, the plant's discharges to the Mississippi are regulated by applicable Federal effluent limitations under Sections 401 and 402 of the Federal Water Pollution Control Act. Section 401 is a certification and Section 402 is the National Pollutant Discharge Elimination System (NPDES) Permit, which are issued by the State of Mississippi. These restrictions on the plant effluent into the Mississippi River are not affected by the proposed action.

In NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants," dated October 27, 1995, the use of groundwater at GGNS, from the radial collector wells for the cooling tower makeup, is discussed in Sections 4.8.1.4 and 4.8.2.2, in terms of the impact of the groundwater intake on the groundwater level and the water quality. These sections state that the intake of cooling water by GGNS does not conflict with other groundwater uses in the area and that the intake water quality will not be lower than that in the nearby Mississippi River. This is consistent with Section 2.4 of the UFSAR. Therefore, NUREG-1437 shows no adverse environmental impact by the proposed action; however, if the licensee should apply for license renewal of the GGNS full-power operating license under 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," the issue of other groundwater uses in the vicinity of the plant would be addressed.

6. Conclusion

Beyond the impacts discussed above, the proposed action will not increase the probability or consequences of any accidents and will not change the licensed power level for the plant. No changes are being made to any structure, system, or component in the plant, to how the plant is operated, in the types of any effluents that may be released offsite, and in the allowable individual or cumulative occupational radiation exposure for the plant. Accordingly, the Commission concludes that there are no significant radiological environmental impacts associated with the proposed action.

With regard to potential nonradiological impacts, the proposed action does involve features located entirely within the restricted area as defined

in 10 CFR Part 20. It does not affect nonradiological plant effluents and has no other environmental impact. Accordingly, the Commission concludes that there are no significant nonradiological environmental impacts associated with the proposed action.

Alternatives to the Proposed Action:

Since the Commission has concluded there is no significant environmental impact associated with the proposed action, any alternatives with equal or greater environmental impact need not be evaluated. As an alternative to the proposed action, the staff considered denial of the proposed action. In this case, GGNS would shut down upon expiration of the present full-power operating license. Denial of the application would result in no change in current environmental impacts. The environmental impacts of the proposed action and the alternative action are similar.

In Section 6.4 of the FES, a benefit-cost analysis was presented for the operation of GGNS. The environmental costs for the extended period of operation would be less than the cost of the replacement power or the installation of new electrical generating capacity. Moreover, with the extended period of operation, the overall financial cost per year of the plant would decrease because the initial capital outlay would be averaged over a greater number of years of operation. In summary, the benefit-cost of operating GGNS would improve with the extended plant operating lifetime.

Alternative Use of Resources:

This action does not involve the use of any resources not previously considered in the FES for the GGNS.

Agencies and Persons Consulted:

In accordance with its stated policy, on April 8, 1997, the staff consulted with Mississippi State officials, Robert Goff and Robert Bell of the Division of Radiological Health, State Board of Health, regarding the environmental impact of the proposed action. The State officials had no comments.

FINDING OF NO SIGNIFICANT IMPACT

Based upon the environmental assessment, the Commission concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the Commission has determined not to prepare an environmental impact statement for the proposed action.

For further details with respect to the proposed action, see the licensee's letter dated July 21, 1995, which is available for public inspection at the Commission's Public Document Room, The Gelman Building, 2120 L Street, NW., Washington, DC, and at the local public document room located at the Judge George W. Armstrong Library, 220 S. Commerce Street, Natchez, Mississippi 39120.

Dated at Rockville, Maryland, this 11th day of April, 1997.

FOR THE NUCLEAR REGULATORY COMMISSION

William D. Beckner

William D. Beckner, Director
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