50-416

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

May 14, 1997

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

SUBJECT: COMPLETION OF LICENSING ACTION REVIEW FOR GENERIC LETTER 96-04, "BORAFLEX DEGRADATION IN SPENT FUEL POOL STORAGE RACKS," FOR GRAND GULF NUCLEAR STATION, UNIT 1 (TAC NO. M95952)

Dear Mr. Hagan:

Generic Letter (GL) 96-04, "Boraflex Degradation in Spent Fuel Pool Storage Racks," was issued by the Nuclear Regulatory Commission (NRC) to licensees on June 26, 1996, to address the degradation of Boraflex material in spent fuel storage racks. The GL requested that you (1) assess the capability of the Boraflex to maintain a 5-percent subcriticality margin and (2) to submit a plan describing any proposed actions if this subcriticality margin cannot be maintained by the Boraflex because of current or projected degradation of the material. You responded to the GL in your letter of October 16, 1996 (GNRO-96/00118), for Grand Gulf Nuclear Station, Unit 1 (GGNS).

In your response, you stated that the storage racks in the spent fuel pool and upper containment pool at GGNS use Boraflex as a neutron absorber to maintain the required subcriticality margin. The Boraflex is enclosed between stainless steel sheets with the edge strips welded in place to frame the Boraflex. A program monitors Boraflex behavior through the removal of coupon specimens which are periodically removed and tested to determine the size and frequency distribution of gaps in the Boraflex panels. Tests are also conducted each cycle in the same area of the spent fuel pool where the most recently discharged spent fuel is stored. Following 10 to 14 months of irradiation, an operating cycle is about 18 months, the spent fuel is removed and tests are performed on at least 50 rack cells. These tests were initiated after the receipt of Information Notice (IN) No. 87-43 alerting licensees to the degradation of Boraflex panels in the high-density spent fuel racks at Quad Cities, Unit 1. The results, and an analysis of the results, for the six tests were included in your letter of October 16, 1996.

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After the IN, a criticality analysis was also performed to demonstrate the safety of the storage racks at GGNS with Boraflex gaps as large as 6 inches and submitted to the NRC on February 27, 1989. On April 26 and June 7, 1990, an additional analysis was submitted to address the storage of additional fuel types. The analysis assumed that 6-inch gaps were present in the Boraflex panels and included a 10% reduction in the B-10 areal density as an allowance to accommodate potential degradation due to water ingress. This analysis was approved by NRC in its letter of July 16, 1990.

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Because the sixth test and last in-pool test has shown gap sizes greater than the 6 inches assumed in the previous criticality analysis, you have stated that the criticality analysis is being revised to include the results from the sixth test and an allowance for Boraflex degradation due to water ingress. Because the irradiation dose to the racks from the most recently discharged spent fuel in the test area is significantly higher than the other racks outside the test area, you state that the dose to these other racks will remain below the dose corresponding to the fifth test through the end of Cycle 9, the current operating cycle, and have placed the spent fuel from the last refueling outage outside the test area. Because criticality analysis assumptions were confirmed to bound the Boraflex configuration from the fifth test, you stated that the 5-percent subcriticality margin will be maintained through the current operating cycle. You also stated that the revised analysis will be completed before the end of Cycle 9 and the next refueling outage when spent fuel will again be placed in the spent fuel pool.

In addition to the criticality reanalysis to ensure that the 5-percent subcriticality margin will be meet for the life of the racks, you stated that the in-pool tests will be continued until it is demonstrated that the Boraflex degradation in the panels has reached equilibrium and it is confirmed that the test are bounded by the criticality analysis.

Because silica concentrations in the spent fuel pool water are indications of degradation of the Boraflex in the racks due to water ingress, you have provided pool silica concentrations from 1988 to April 1996. You pointed out that the rate of increase in silica concentrations following each refueling outage has been slightly steeper in the most recent refueling outages. You stated that the indication of Boraflex degradation based on this change in silica concentrations depends on a detailed evaluation of the pool design and operation which has not been conducted at GGNS. Because the Electric Power Research Institute has developed a system to perform this evaluation and the system has been successfully applied at another site, you stated that a model is being developed to use this system to perform a detailed evaluation at GGNS before the next and the future refueling outages.

The staff has evaluated the information provided in your letter of October 16, 1996. Based on our evaluation, we conclude that your approach is acceptable to resolve the issues of Boraflex degradation in GL 96-04. Because we have been informed by your staff that the subcriticality reanalysis has been completed, we request that you submit the results of the reanalysis, and your conclusions and actions concerning the spent fuel racks and testing the Boraflex material within 120 days of receipt of this letter. We also request that you provide the results of the detailed silica concentration evaluation of the GGNS spent fuel pool, to be performed for the refueling outage, within 90 days after the evaluation is completed.

If you have any questions regarding this matter, please contact Jack N. Donohew at 301-415-1307. This letter closes out the staff's review under TAC No. M95952.

Sincerely,

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

cc: See next page

If you have any questions regarding this matter, please contact Jack N. Donohew at 301-415-1307. This letter closes out the staff's review under TAC No. M95952.

Sincerely,

(5/14/97)

Jack N. Donohew, Senior Project Manager
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