April 6, 1994

Docket No. 50-416

Mr. C. Randy Hutchinson
Vice President, Operations GGNS
Entergy Operations, Inc.
Post Office Box 756
Port Gibson, Mississippi 39150

Dear Mr. Hutchinson:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION RELATED TO REQUEST FOR EXEMPTION TO APPENDIX J - GRAND GULF NUCLEAR STATION, UNIT 1 (TAC NO. M87209)

The staff is continuing its review of your submittal dated August 18, 1993, in which you requested an exemption to the requirements of 10 CFR Part 50, Appendix J, for the Grand Gulf Nuclear Station.

To permit us to continue our review on our current schedule, we require that the information requested in the enclosure be provided within 60 days of your receipt of this letter.

This requirement affects fewer than 10 respondents and, therefore, is not subject to Office of Management and Budget review under Public Law 96-511.

Sincerely,

ORIGINAL SIGNED BY:

Paul W. O'Connor, Senior Project Manager
Project Directorate IV-1
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc w/enclosure:
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

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ENCLOSURE

REQUEST FOR ADDITIONAL INFORMATION

CONCERNING REQUEST FOR EXEMPTION FROM 10 CFR PART 50, APPENDIX J

GRAND GULF NUCLEAR STATION

DOCKET NO. 50-416

1. The application provides, in a number of areas of the document, justification that proposed methods for conducting Type B and C tests would meet performance goals based on IPE results and be safety neutral. The following are areas where this discussion is provided in the document:

   - Equation on p. 7 and following discussion, and Figures 2-1 and 2-2.
   - p. 25, Section on Internal Valve Leakage
   - p. 30 and 31, Section on Containment Isolation
   - p. 31 and 32, Section on Containment Bypass

   These discussions are related; however, they appear in different parts of the document and the links between the discussions are not clear. A logical integrated discussion regarding the goals and assessment methods for the proposed Type B and C test scheme is necessary in order to assess its merit.

2. The application proposes a containment system performance goal, based on the plant's IPE, for assessing the adequacy of the proposed Type B and C test scheme. However, a discussion of how this performance goal would be used to track the performance of the Type B and C tests at each outage is not provided. Does Grand Gulf intend to implement such a tracking system? If so, details of the performance monitoring need to be provided.

3. Baysian statistics are used to evaluate component reliability based on generic data and component performance history. Baysian analysis normally deals with both the means and standard deviations of the prior, conditional, and posterior distributions. The equation of page 6 is the basic form of Bayes equation. However, no information or supporting equations are provided to illustrate the actual use of the basic concept for this particular application. The handling of the standard deviation is not described. Provide the missing information.

4. In generating Figure 2-1, Isolation Valve Failure Rate Estimates, generic component failure rates are again used. The decreasing component failure rate over time is based on no observed failures of the component over time. The calculation ignores any component failures which may have occurred prior to the time "0". It appears that once a component undergoes maintenance, it is assumed to be "as good as new." The reliability of a component would be expected to be both a function of the

nature of the component as well as its environment. The environmental aspect as measured by the component performance history does not appear to be considered. If a specific component fails frequently, a higher rather than a decreasing failure rate for the particular component is expected. This should be reflected in the Baysian analysis.

5. The application for exemption from the existing requirements focuses largely on the Baysian analysis, but the description of this analysis is poor, and its application inconsistent. Results which should fall out of the Baysian analysis, such as the need to maintain the current testing intervals for components with historically high failure rates, are handled as "special cases." Given this, it is not clear that the Baysian analysis really adds much tc the proposal. Assuming that component failure rates are not increasing with time, extending the test interval for all components from 2 to 10 years increases the probability of containment leakage by at most a factor of 5. This should correspond to an approximate factor of 5 increase in the incremental risk due to containment leakage, assuming no bias toward very large leakages. The purpose of the Baysian an lysis and its relationship to other justifications presented in the application should be clarified.

6. The equation for the probability of penetration leakage (p. 7) assumes independent failures of the components in the penetration. For the low failure rates considered, common mode failures of the components in a penetration would likely dominate the independent failure probability. While common mode failures are ignored in the analysis, they are apparently addressed in the proposal by basing the test schedule for all components in a penetration on the performance of the worst component. A discussion of common mode failures should be included in the application.

7. Figure 2-2 does not appear to be consistent with Figure 2-1. We understand that a corrected version of this figure will be provided.

8. As part of its request, Grand Gulf proposes that if a component is repaired for reasons other than excessive leakage, no re-baselining of the component would be performed. Since maintenance errors are likely causes of near term failures following maintenance, this aspect of the proposal needs further justification.

9. §3.2, pg 11.(a) A stronger link between the Maintenance Program and isolation valve performance would be helpful. For example, would changes in the Maintenance Program change isolation valve failure rates and thus the database upon which the exemption rests? If so, how would such changes be monitored and evaluated? (b) If a valve has had a good leak rate performance, does Entergy plan to reduce preventive maintenance on that valve? If preventive maintenance <u>is</u> reduced, what assurance is there that the valves' good performance will continue?

10. §3.3, pg 13. Describe in more detail the "evaluations performed to determine which components are required to be Type B/C tested."

11. §3.3, pg 16. Described how the criteria of §3.2 were applied where a component was adjusted to a 2- to 5-year interval from a 10-year interval based on performance. Use a specific example.

12. §3.4, pg 19, #7. Describe how a "surveillance" could detect a "valve failure to close at system pressure." What kinds of surveillance would be involved?

13. From the information on current numbers of Type B and C components tested and the preliminary interval assignments, the estimated reduction in Type B and C testing for the proposed performance-based exemption can be calculated to be about 60 percent. However, the cited cost saving of $7.3 million represents more than 80 percent of the remaining costs that would be incurred under the current requirements. Explain this discrepancy.

14. Type B and C testing, under current requirements, requires about 20,000 labor hours per refueling outage. As there are currently 92 Type B and 297 Type C components being tested, the average number of labor hours per component is about 51. At the PWR used in a separate analysis, an average of about 2,500 labor hours are spent in testing 130 Type B and 196 Type C components, or about 8 labor hours per component. Can Entergy offer any insights into why the labor hours spent per component differ between the two plants by almost a factor of 7? The estimate for the PWR is derived from a matrix showing Departmental Totals (e.g., Engineering, Health Physics, QA) by Activity (e.g., Planning, Long-Term Preps, Conducting Tests). Can a similar matrix be provided to show what labor hours are included in the Grand Gulf estimate?

15. In estimating the potential cost savings from the elimination of Type A tests, Grand Gulf considers labor hours and replacement power costs. The estimate does not include any equipment rental charges for compressors and air dryers or the services of a specialty consultant to conduct the Type A test. Does Grand Gulf rely on rental equipment and/or a consultant? If so, these costs should be provided.

16. In Section 4.6, the labor hour estimate for a Type A test is given as 2,000 per refueling outage. As the dollar estimate uses 2,000 hours per test, is it correct to assume that the "per refueling outage" is simply a typographical error?

17. Does Entergy currently conduct a full battery of Type B and C tests prior to initiating a Type A test at Grand Gulf? Does Entergy propose to do so if its exemption request is granted?

18. In the proposed Type B and C testing program it is stated (p. 12), "All components located in a penetration of a failed component will be evaluated for placement in the same interval as the failed component." What will be the basis for making such a determination? Should all

components in a penetration of a failed component be automatically placed in the same interval as the failed component?

19. It is indicated on p. 12 that, "A portion of the components that are on 5 and 10 year intervals will be scheduled for testing each outage to assist in identifying common mode failures." How large a portion will this be? How will the components to be tested be selected?

20. "An as-found Type B/C test, as appropriate will be performed prior to any maintenance or modification activity performed on a component if the activity could affect the component's leak tightness. Components remaining on 2 year intervals will not require as-found testing during outages during which a Type A test is not performed." (p. 12) What will be the basis for determining when an as-found test is appropriate? If as-found testing is not performed under either of the above conditions, how can the performance history of components be determined?

21. The IPE assessment of containment failure to isolate is based on "random independent failures of two valves" (p. 31). An earlier question noted that neglect of common cause failures is nonconservative. A more fundamental problem is the implication that the probabilities of containment isolation failure and excessive leakage are the same; they are not. Failure to isolate would typically require the failure of two valves within a penetration to close; such an occurrence should have a low probability. Excessive leakage, on the other hand, can take place even if the valves close but fail to seal tightly. The latter could be a relatively frequent occurrence, as evidenced by the leak rate test experience discussed in Draft NUREG-1493.

    Justify the use of a criterion in terms of failure to isolate to judge acceptable performance in terms of leakage.

22. It is the staff's understanding that Grand Gulf performed a Type A test late in 1993. Are the results of this test together with the associated Type B and C tests available? If so, provide the results (reference to previously docketed materials is acceptable). If not, provide a short summary. If the Type A test failed, discuss the reasons for the failure and the impact this may have on the basis for Entergy's exemption request (in other words, would not failure of two out of the three periodic Type A tests performed in the plant's lifetime suggest that reduced test frequency is not justified?).

23. Although the probability of containment leakage other than through Type B and C components is low, there are documented cases of leakage through the containment structure that could only be found by a Type A test. In view of this, Entergy should propose a program to assure, through appropriate testing, that gross leakage through the containment structure would be discovered prior to startup following every extended outage during the 10 year period between Type A tests. The staff does not consider it necessary that the leakage be quantified, nor that the

leakage be demonstrated to be less than L_a, but the test should provide an appropriate level of assurance that excessive, or gross, leakage would not occur following a postulated design basis accident.

24. Justify why those valves which are to be excluded from the performance-based program and leak tested every two years should not be listed in the technical specifications.

25. The basic premise behind the exemption request is that testing frequency should be based on the performance of the component, rather than being set at an "arbitrary" fixed frequency by a regulation. If good performance justifies reduced frequency, then conversely poor performance calls for increased frequency, logically. However, the proposed program has no provision for increasing frequency beyond the regulation's once-in-two-years for Type B and C testing. The proposal is that components that have passed one test, or failed one test, will be tested once in two years. Should not a component that has failed two consecutive tests be tested more often, say, once a year, and a component that failed three times be tested even more often, say, twice a year? An earlier answer to this question (given at a meeting), that Appendix J says once in two years is good enough so that will be the maximum frequency, is not acceptable to the staff. If frequency is to be "cut loose" from the Appendix J number, then it should move in either direction, based on performance. Provide justification for the assumption, implied by the requested exemption, that performance-based frequency is good, but only in the decreasing direction (compared to Appendix J's required frequency).

26. Explain the choices of 5 and 10 years for intervals for Type B and C components that pass 2 and 3 consecutive tests, rather than something shorter (for example, 2 refuelings and 3 refuelings). Ten years is a large increase in interval, five- or six-fold (for 18-month fuel cycle). The staff has never more than doubled the interval, even on a one-time basis, and permanent exemptions have not increased interval beyond 30 months.

27. The practice at Grand Gulf, as the staff understands it, is to not require as-found Type B and C testing except during outages when Type A tests are conducted. However, only as-found data are valid as indicators of component performance. How much of the Grand Gulf data, used in the analyses supporting the exemption request, are not as-found data, and what effect does this have on the validity of the analyses?

28. The submitted analyses seem to be tied to class 9 accidents rather than design basis accidents, and yet Appendix J addresses and accounts for only design basis accidents. Explain the appropriateness of the analyses in light of this observation.

29. It has been suggested that RCM/PRA methods (reliability-centered maintenance/probabilistic risk assessment) would provide a better

analysis of Type B and C component performance and test frequency than the Baysian analysis used in the submittal, and would account for aging and cycling of components. Provide an assessment of this seemingly superior method and compare it to the Baysian method.

30. Resilient seals have limited lifetimes. Does the proposed program take this into account?

31. Discuss the effects of aging on possible valve leakage mechanisms and explain, in terms of these effects, why it is acceptable to not leak test a valve for up to 10 years. Also, in terms of Type B testing, it has been said that ANO, Trojan, and possibly Davis-Besse are having (or have had) electrical penetration leakage problems; ANO reportedly had 16 fail at once. Heretofore, the conventional wisdom has been that electrical penetrations never leak significantly. Similarly, piping penetration expansion bellows in some older plants have recently exhibited Type B testing problems and excessive leak rates (see NRC Information Notice 92-20), whereas before they were also thought to be stable, leak-tight boundaries. How will the proposed program detect or prevent these kinds of problems, which seem to be related to aging or wear?

32. Name the manufacturer of Grand Gulf's electrical penetration assemblies. The staff believes that certain CONAX electrical penetrations have a failure mechanism (a plug that could be missing) that would not be picked up by Type B testing.

33. If the requested exemption is granted, how will ASME Section XI inservice (IST) leak rate testing requirements be satisfied? They currently require tests at no more than 2 year intervals. Will Grand Gulf need relief from Section XI?

34. How do the submitted probability calculations account for human error?

35. Do generic MOV failure rates apply to Grand Gulf? To be applicable, would a good MOV maintenance program be required? Substantiate the efficacy of the Grand Gulf program.

36. In section 3.3 of the submittal, the causes of failure are not addressed, nor is the definition of failure nor the physical problems that caused the failures. Provide this information.

37. In section 4.5, the first bullet states that "other testing programs will effectively detect containment leakage." This is vague; describe the other testing programs.

38. In section 6.0, under the heading "50.12(a)(2)(ii)," it says that this exemption provides "alternative means" to achieve the underlying purpose of the rule. The means are, in fact, the same, except that the tests will be performed less frequently. How does this comply with 50.12(a)(2)(ii)?

39. The proposed Technical Specification changes delete 4.6.1.2.d.2. and 4.6.1.2.f. These passages cover the main steam isolation valves (MSIVs) and require them to be leak tested at least once per 18 months. Since the MSIV testing interval would not be changed under the proposed program, explain the reason for the proposed deletions.

40. The proposed change to Technical Specification 4.6.1.3.a. is at least confusing and possibly in error. Currently, it requires air lock door seal leak rate testing within 72 hours after each closing, except when the air lock is being used for multiple entries, in which case the test would be required once every 72 hours. The proposal would change only the latter occurrence of "72 hours" to "30 days." Explain what would happen when the two parts of this requirement conflict. For example, if an air lock is opened (and closed) and then not opened again until 5 days later, would a test be required within 72 hours of the first closing? Within 72 hours of the second closing? Since there are now multiple entries in a 30 day period, would one wait until the end of the 30 day period to test? If 72 hours pass after a closing and the time until the next air lock use is unknown, does one wait to see if it gets used in the next 27 days? If it doesn't, isn't that then a violation of the 72-hour interval? Considering the frequent use made of the air locks at Grand Gulf, would the 72-hour limit ever come into play?