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

MAY 30 1975

R. C. DeYoung, Assistant Director
for Light Water Reactors, Group 1
Division of Reactor Licensing

TECHNICAL ASSISTANCE REQUEST (TAR-1579), GRAND GULF 1 AND 2, MARK III CONTAINMENT SUPPRESSION POOL DYNAMIC LOADS

In accordance with your request dated April 29, 1975, the Structural Engineering Branch has reviewed the applicant's report on the subject matter and found that additional information is required before the review and evaluation can be completed. The information required is contained in the enclosure in the form of questions. These questions should be transmitted to the applicant as soon as possible so he may be able to discuss them in the meeting scheduled for June 3, 1975.

Please note that the applicant's structural evaluation for the revised relief valve loads will not be completed until June 20, 1975. It is therefore apparent that the schedule for completing the review of the subject report and for writing our evaluation report should be accordingly revised.

R. R. Maccary, Assistant Director
for Engineering
Division of Technical Review

Enclosure: As Stated

cc w/encl:

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GRAND GULF 1 AND 2
POOL DYNAMIC LOADS
REQUEST FOR ADDITIONAL INFORMATION
STRUCTURAL ENGINEERING BRANCH

1. For all the critical load combinations, provide a breakdown of loads, including moments, forces, and shears, and steel and concrete stresses at the base of the containment wall, the drywell wall and the weir wall, and at locations of maximum meridional forces. For the drywell, provide a similar breakdown at the top of the lower structural plates of the drywell.

2. In Section I, Paragraph 5.1.3, a vent clearing pressure of 10 psi acting on the weir wall is described. Discuss the consideration of this load in the design of the weir wall.

3. Describe the combination of S/R valve discharge loads on the weir wall in combination with chugging, earthqauke or other loads.

4. From the drawings supplied with the report, it is apparent that the floors that are subject to pool dynamic loads are supported on the drywell and on the containment wall. Describe the details of such supports and provide justification for the initial assumption that there will be no lateral interaction between the drywell and the containment walls.

5. The report provides information in various places on stresses in the reinforcing, not in the concrete. Provide information on concrete tensile, compressive and shear stresses.

6. In your planned analysis for revised safety relief valve loads, describe the method of analysis of the drywell and containment walls for the unsymmetrical loading caused by actuation of one or several safety/relief valves.

7. Indicate if the design of the containment base slab or any portions thereof, including the vertical dowels of the containment wall and interior concrete and any other anchors of the drywell plates and containment floor liner plate, is sensitive to any of the load combinations involving pool swell loads or SRV loads, particularly for the revised SRV loads for which you have not yet completed the analysis. Furthermore, provide the margin available in the present design that will permit higher pool swell or SRV loads and/or higher load factors without exceeding allowable limits. Also, indicate if the base slab design is sensitive to any future change in the design and layout of the interior structures.

8. Your drawing No. C-1074 (Rev. 3) indicates that there are several floors and platforms near El. 120'-0" that can be subjected to the effects of bulk pool swell. Indicate if all of these floors are designed to resist the load described in Fig. 10.2. If some are not designed to resist such loads, describe the effects of the debris that may fall into the suppression pool due to any structural failure.

9. On page 3-1, the implication of the last sentence may not be always true. Depending on the dynamic properties of the containment and the rise time and duration of the various loads, the containment may respond to two or more given loads at the same time even though the loads occur at different times. In other words, the effects of various loads occurring at different times may combine. Accordingly, provide justification for combining only the loads that span a given time in the bar charts.

10. Since most of the dynamic loads discussed in the report have not yet been verified by the ongoing test program, identify in summary form all the structural elements that will have to be redesigned should the loads prove to be significantly higher and indicate how much margin is available in the present design to resist potentially higher loads.

11. Describe the analysis performed to determine the effects of negative pressures in the suppression pool on the containment and drywell lower liner plates, particularly when combined with effects of high temperatures, seismic loads, and cracking of the concrete and provide a summary of the results.

12. For all the dynamic loads associated with loss-of-coolant accidents and safety relief valve discharges, describe the procedures used to analyze for the dynamic effects of the loads including procedures for determining natural periods of vibration, dynamic load factors and time of maximum response. Furthermore, provide a summary of the results of such an analysis for all the structures surrounding the suppression pool. Also describe the methods of taking cracking of concrete into consideration and such discontinuities as the several penetrations in the lower region of the wall.

13. Concerning the load combinations presented in Table 3.2.1 and page 11 of Section II, provide the following:

    a. Justification for not specifying a load combination similar to combination (10) but for the pool swell condition, i.e., with a load factor of 1.5 applied to R_B. Attention should be given to the fact that R_B acts on the containment over a large area (60' x 360°) and is just as probable and important as is the P_{CD} load. In addition, the fact that the containment will not be tested for R_B makes its leak-tight integrity under such a load questionable, particularly if stresses reach the value associated with U but without a load factor applied to the load.

    b. Justification for the load factors used in combining SRV loads (C or C') with OBE loads.

14. Justify the use of a 1.0 load factor on R_p in the design of floors above the suppression pool.

15. The loads due to T_o, as shown on page 16 of Section II, seem relatively high. It is also apparent that stresses due to T_o have been relied upon to reduce effective stresses due to other loads. Provide assurance and justification that such stresses will be present. Furthermore, describe the assumptions and procedures utilized to calculate these thermal loads including information on assumed temperatures and thermal gradients, assumed modulus of elasticity of concrete, effects of cracking and the possibility that these loads may be self limiting due to creep and cracking of conrete. Also, describe the considerations given to thermal loads induced by T_a.

16. On page 20 of Section II allowable stress in shear ties is shown as 60000 psi. These shear ties are intended to resist axisymmetric radial shear such as will exist at the shell and mat junction. The stress limit should be guided by the average stress limit of 0.9 F_y. Modify this part and indicate an allowabel stress of 54000 psi.

17. The reliance on elasto-plastic behavior of safety-related structures when subjected to large-area abnormal loads, such as the pool swell load on the floor at El. 135'-0", is not acceptable to the NRC staff. Accordingly, revise your design of the safety-related floor at El. 135'-0" and any other structures similarly designed or otherwise provide sufficient and detailed justification of why you consider elasto-plastic behavior acceptable and with sufficient margins of safety.