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

Docket Nos. 50-416
and 50-417

OCT 16 1975

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

TECHNICAL ASSISTANCE REQUEST (TAR 1579), GRAND GULF UNITS 1 & 2
MARK III CONTAINMENT SUPPRESSION POOL DYNAMICS

In accordance with your request dated August 20, 1975, the Structural Engineering Branch has reviewed the report on the subject matter. We find that additional information is required before the review and evaluation can be completed. The information required together with staff positions is contained in the enclosure.

W. Kreitmeyer

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

Enclosure: As Stated

cc w/o encl:
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cc w/encl:
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GRAND GULF UNITS 1 & 2
MARK III POOL DYNAMICS
REQUEST FOR ADDITIONAL INFORMATION
STRUCTURAL ENGINEERING BRANCH

1. Explain or correct the following inconsistencies and over-stresses in the computations:

   a) On Page 26, the meridional force, N_r, for T_o with a cracked section is zero, but is 8 kips with an uncracked section; on Page 27, for $(T_o + T_a)$ with an uncracked section N_r is zero.

   b) On Page 27, it appears that the membrane tension due to N_r is not large enough to offset the compression due to M_r. Therefore the concrete stress, f_c, corresponding to f'_s = 43,700 psi should not be zero. Also clarify the inconsistency between 1.0 $(T_o + T_a)$ uncracked and f_c = 0 psi (section completely cracked).

   c) The maximum stress in the diagonal reinforcement of the containment is listed as 59,200 psi on Page 30. The stress in reinforcement should be limited to $0.9f_y$ for such load conditions. Justify the apparent overstress.

   d) On Page 33 under Item b, f_c is shown to be -6.1 ksi. Indicate the concrete strength used in your design. If this is higher than the specified strength, justification should be provided for the use of concrete strength over that specified.

   e) On Page 35 under Item b., f_s is shown to be -326.824 ksi. Such a high stress is unacceptable and should be explained or corrected.

2. The explanation provided on Page 52 regarding the use of 1.0 load factors for pool swell and SR/V discharge loads is not acceptable. Conservatism in the load is not a sufficient basis for reduction in load factors. If the load is ultra conservative, the staff suggests the use of appropriate loads and appropriate load factors. The pool swell and main steam/relief valve (SR/V) discharge loads should be treated as indicated in the attached NRC staff position regarding load

factors and load combinations for BWR Mark III Containment Pool Dynamic Loads. Any deviation from the attached position should be justified.

3. On Pages 54 and 57 the use of elasto-plastic analysis is indicated for floors subject to bulk and froth swell. The staff will permit elasto-plastic analysis & design due to pool swell only for floors, walkways and grating which do not support safety related equipment. However, acceptable maximum design ductility ratios used therewith must be specified in the PSAR.

4. On Pages 55 and 56 a discussion is presented regarding thermal stresses offsetting mechanical stresses. It is apparent from Pages 26-30 that thermal stresses were utilized to offset mechanical stresses. This is not considered acceptable. Revise the calculation and design, if required, accordingly.

STRUCTURAL ENGINEERING BRANCH POSITION
U.S. NUCLEAR REGULATORY COMMISSION

BWR MARK III CONTAINMENT POOL DYNAMICS

1. POOL SWELL

   a. Bubble pressure, bulk swell and froth swell loads, drag pressure and other pool swell loads should be treated as abnormal pressure loads, P_a. Appropriate load combinations and load factors should be applied accordingly.

   b. The pool swell loads and accident pressure may be combined in accordance with their actual time dependent mutual occurrence.

2. SAFETY RELIEF VALVE (SR/V) DISCHARGE

   a. The SR/V loads should be treated as live loads in all load combinations with the exception of the combination that contains $1.5P_a$ where a load factor of 1.25 should be applied to the appropriate SR/V loads.

   b. A single active failure causing one SR/V discharge must be considered in combination with the Design Basis Accident (DBA).

   c. Appropriate multiple SR/V discharge should be considered in combination with the Small Break Accident (SBA) and Intermediate Break Accident (IBA).

   d. Thermal loads due to SR/V discharge should be treated as T_o for normal operation and T_a for accident conditions.

GRAND GULF POOL DYNAMICS 10-17-75

Letter of 8-15-75

pg 1 - drywell equip. hatch, drywell pen. sleeve and lower cont. pen. sleeve should be lowered into pool

pg 2 - quenchers to be provided

pg 4 - confirm. that rams head loads are calculated by GE topical NEDE-20942-P

pgs. 6-10 - SRV loads on submerged structures should be based on rams head discharge
- SRV bubble loads should be applied to all submerged structures

pg 39 - 2 adjacent SRVs should be design basis for asymm. as recommended by GE - confirm for GG

pg 72 - asymmetric bubble - design basis?

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