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Docket No. STN 50-437

Mr. A. P. Zechella
President
Offshore Power Systems
P. O. Box 8000
8000 Arlington Expressway
Jacksonville, Florida 32211

Dear Mr. Zechella:

SUBJECT: CONTAINMENT SHELL BUCKLING CRITERIA REVIEW
(Floating Nuclear Plants 1-8)

We have reviewed your topical report No. 7270-RP-16A51, "Buckling Criteria and Application of Criteria to Preliminary Design of the Containment Shell for the Floating Nuclear Plant," and find that we are in need of some additional information which is described in the Enclosure. We have discussed this matter with members of your staff and have arranged to meet with them in Jacksonville on November 16 and 17, 1978.

We request that your response be provided either as an amendment to the PDR or a revision to the topical report.

Sincerely,

Original Signed by

Robert L. Baer, Chief
Light Water Reactors
Branch No. 2
Division of Project Management

Enclosure:
Request for Additional Information

ccs w/enclosure:
See next page

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PDR ADOCK 50-437A

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DATE	11/6/78	11/6/78				

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ENCLOSURE
FLOATING NUCLEAR POWER PLANT
STRUCTURAL ENGINEERING BRANCH
REQUEST FOR INFORMATION

1) The stress analysis assumes that cutout reinforcement as prescribed by the ASME Pressure Vessel Code is sufficient to alleviate stress concentrations. How certain is this assumption? What studies have been made to substantiate this claim?

2) The buckling analysis replaces the two-dimensional stress distribution by uniform stress distributions. These correspond to combined axial, circumferential and shear stress. The stress components at every point in the shell are compared to the critical uniform stress values. While the effectiveness of opening reinforcement can also be questioned, more questionable is the procedure of replacing the variable geometry shell by a shell having uniform properties. What is the justification for this method? Why is not the stress analysis model also used for buckling analysis?

3) Capacity reduction factors have been defined on the basis of Koiter's asymptotic imperfection sensitivity studies and assumed deformation amplitudes. In the present study, the deformation amplitudes are taken as the maximum out-of-roundness values permissible under the ASME Pressure Vessel Code, the shell thickness. With such a large "imperfection" the method is conservative. The choice of amplitude is rather arbitrary, however, and may be too severe. Lesser amplitudes may yield unconservative results since it is not at all certain that the ASME tolerances control all of the imperfections which reduce buckling loads. Why isn't aerospace industry experience in the form of empirical buckling criteria, NASA SP-8007, 8032, for example, used?

4) Dynamic reduction factors are in question since the literature indicates that for axial load, the dynamic buckling load is at least 70.9% of the static buckling load of the imperfect structure. Why, then, is the capacity reduction factor equal to unity when the dynamic stress is greater than 1.42 (1/.707) of the static stress?