FNP-MNE-889

Offshore Power Systems

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A Westinghouse-Tenneco Enterprise

January 31, 1979

Mr. Robert L. Baer, Chief
Light Water Reactors Branch #2
Division of Project Management
US Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, MD 20852

Dear Mr. Baer:

RE: Docket #STN-437, Containment Shell Buckling Criteria and Application

On December 21, 1978, (Ref. FNP-MNE-879) we submitted responses to your request for additional information on the above subject. In this response and in the Plant Design Report, Section 3.8.2.6.4, we refer to an independent confirmation of the buckling analysis. As discussed in our meeting on November 16th and 17th, the scope of this independent confirmation will be revised to reflect the generic recommendations of the NRC consultant to be published in the near future as a result of your current contract with the consultant.

The attachment to this letter provides additional information concerning the method by which we propose to confirm the buckling analysis. This approach follows the methodology recommended by your consultant in the meeting of November 16th and 17th. This information will be incorporated in a revision to the Plant Design Report and buckling report after the consultant's recommendations are published and after obtaining your concurrence that the approach is satisfactory.

Sincerely,

P. B. Haga

P. B. Haga, Director
Plant Analysis & Licensing

/jm

attachment

cc: V. W. Campbell
A. R. Collier

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Attachment

PROCEDURES OF INDEPENDENT BUCKLING ANALYSIS FOR VERIFICATION OF THE FINAL CONTAINMENT SHELL DESIGN

1. Based on the methods of shell analysis and design as described in Reference (2) and supplemented by the methods described in the answer to Question 3 of Reference (1), several critical loading cases are selected for independent verification analysis.

2. An accurate two-dimensional (three-dimensional thin shell) linear elastic stress analysis of the shell including the effects of stiffening, penetrations, and dynamic loading is made.

3. For a particular instant of time, the axial, circumferential and shear stresses at each nodal point are increased by dividing each by a reduction factor for uniform axial, circumferential and shear stress. These reduction factors are defined in the answer to Question 3 of Reference (1).

4. The shell model is analyzed for linear bifurcation buckling under the increased stress distribution. In this analysis, the modified stress distribution is multiplied by a constant factor, say λ, which is then determined as the lowest eigenvalue of the buckling problem. This value of λ then represents the factor of safety against buckling. These values will be evaluated against the factors of safety identified in the answers to Question 3 of Reference (1) to verify the adequacy of the containment shell design against buckling.

5. A sufficient number of "time snapshots" of the stress state will be considered to ensure the inclusion of the worst condition.

Reference (1): OPS letter FNP-MNE-879 from P. B. Haga (OPS) to R. L. Baer (NRC) dated 12/21/78.

(2): OPS Report #7270-RP16A51, Containment Shell Buckling Criteria and Application, Draft Ref. B., May 1, 1978.