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Peter A. Morris, Director
Division of Reactor Licensing

THREE MILE ISLAND UNIT NO. 1, DOCKET NO. 1, DOCKET NO. 50-289

Adequate responses to the enclosed request for additional information are required before we can complete our review of the subject application. These requests, prepared by the DRS Structural Engineering Branch, concern the containment and Class I structural design material presented in Amendments 15 and 17 of the application. Question 5.22 of the original question list has not been responded to by the applicant.

Original signed by
E. G. Case

Edson G. Case, Director
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Enclosure:
Request for Additional
Information for TMI No. 1

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DATE ▶	2-19-71	2-19-71	2-19-71	2-19-71

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Form AEC-318 (Rev. 9-53) U.S. GOVERNMENT PRINTING OFFICE : 1969—O-364-598

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THREE MILE ISLAND UNIT NO. 1

Docket No. 50-289

ADDITIONAL INFORMATION REQUEST

5.1 (a) Discuss the design approaches used which take into account the effect of transient thermal stresses on parts of structures with variable thickness, such as transitions between the buttress and the wall, between the wall and ring girder, between girder and dome, in thickened part of wall at large openings and, in general, in areas of local thermal stress concentration. Consider also parts of structures where, in consequence of exposure to different temperature conditions, non-uniform temperature distribution may develop.

(b) Discuss whether the containment design can withstand a temperature higher than the LOCA design temperature at a pressure lower than the LOCA design pressure.

5.2 The ACI Code 318 considers 0.85 f'_c as ultimate strength of concrete in beams and not as an allowable stress. Also, the ultimate strength of concrete is decreased when tensile stresses or tensile strain occur in the direction perpendicular to the 0.85 f'_c compression. Justify, therefore, your design approach which neglects these two factors. (pp. 5-17, 17a, 18)

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5.3 (a) Bond and anchorage stresses permitted in ACI 318-63 Code are not sufficiently conservative for nuclear containment structures since the Code does not cover the case of axial tension in the direction perpendicular to the reinforcing bars nor cases with high thermal stresses. Demonstrate that the values of the allowable and ultimate bond and anchorage stresses used in your design are adequate.

(b) The referenced report entitled, "A Study of the Design and Construction Practices of Prestressed Concrete and Reinforced Concrete Containment Vessels, Final Report F-C2121" August 1969 by Chen Pang Tan of the Franklin Institute Research Laboratory does not contain sufficient experimental data to justify the "allowable stresses and yield strengths" specified on pages 102-107. Demonstrate that the values of allowable stresses and ultimate stresses used as specified in the ACI 318-63 Code are applicable under conditions where (1) one or two principal stresses are tensile and (2) one or two principal stresses are zero but the corresponding strains are tensile.

(c) For the case where the reinforcing is not parallel to the principal stress, discuss the manner by which the design takes into account the influence of the shear stress on allowable and ultimate compression stress.

(d) Load factors are intended as margins to take into account not only to the probability of occurrence of a system of loads but also cover the uncertainties of load distribution and stress and strain analyses. A load factor of 1.0 means that the design is done for rupture. Justify this approach by demonstrating that even with this approach a factor of safety larger than 1.0 is achieved.

5.4 Demonstrate that the tendon anchorage zone tensile stresses will not reduce the concrete ultimate compressive stress below design level, and that there is a sufficient margin of safety under all loading conditions. (pp 5d-2, 3 and 21a)

5.5 Explain whether tensile stress concentrations have been included when translating results of the plane stress finite element method used in your design into results corresponding to actual three-dimensional stress and strain distributions in the structures. (pp. 5d-9, 10)

5.6 Justify the omission of reinforcing at locations in the inside face of the wall and dome as well as around liner anchors, where tensile stresses are expected in the concrete. Since concrete cracking is a function of shear and normal compression as well as normal tension, explain how the design takes into account such cracking.

In regions of concrete tensile stresses, specify the measures taken in the splicing and anchorage of the reinforcing. (pp. 5-44, 44a, 45)

5.7 Tendon surveillance is intended to provide a check on potential corrosion under stressed conditions, which may occur under loading conditions in service. Since the proposed tendon surveillance programs do not adequately take this factor into account, either submit a modified tendon surveillance program including the statistical basis for tendon sampling, or provide further justification of the basis for and adequacy of your proposed program. (p. 5-21)

5.14 List the allowable bearing values for different foundations, including the allowable increase for dynamic conditions, and indicate the criteria by which these stresses have been established. (pp. 2-39, 40, 67)

5.24 Justify your bases for limiting deformation checks to three meridions of the containment structure during the structural acceptance test. Although three checks may be adequate for an ideal cylindrical structure, the as-built geometry of structure may include ovality and out-of-roundness characteristics which may dictate the need for more than three control meridions to assess the effects of load reactions during acceptance testing.

5.25 In conjunction with your proposed seismic instrumentation program (page 5-11 of the FSAR) submit your plan of action based on the interpretation of the recordings obtained from the instruments in the event of an earthquake occurring at the site, as related to the actual design capability of the plant to withstand seismic loadings.

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