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TO: Mr Robert W. Reid

FROM: Metropolitan Edison Company
Reading, Pa.
R. C Arnold

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PLANT NAME:

Three Mile Island Unit No. 1

RJL

ENCLOSURE

Consists of response to questions concerning excessive ambient temperatures in their Unit 1 Reactor Building....

(2-P)

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March 25, 1977
GQL 0365

Director of Nuclear Reactor Regulation
Mr. Robert W. Reid, Chief
Operating Reactors Branch #4
U.S. Nuclear Regulatory Commission
Washington D.C. 20555

50-289

Dear Sir:

By your letter dated February 17, 1977, you transmitted a request to answer three (3) questions concerning excessive ambient temperatures in our Three Mile Island Unit 1 Reactor Building.

Attached is our response to those questions. As stated the telephone conversation with Mr. Zwetzig of the NRC on March 22, 1977, this response is being submitted one (1) day late. Should you require additional information please contact either myself or Mr. D. G. Mitchell (Ext. 169).

Sincerely,

R. C. Arnold
Vice President

RCA:DGM:pg
Attachment

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QUESTION:

1. The temperature gradients during normal operation of the plant are in general slowly increasing functions of time. Therefore, the additional creep of concrete has usually the time to relieve part of the temperature stresses. Please indicate therefore: a. whether the effect of the increase of concrete creep due to additional thermal stresses has been considered in the analysis, b. whether the Young's modulus of elasticity for concrete Ec has been adjusted to take care of this effect.

RESPONSE:

1. The increase in operating temperature has been investigated with regard to its effect on concrete creep coefficients used for the Reactor Building analysis.

   Although creep increases approximately linearly with temperature within the range of 32°F to 203°F, the 20°F increase in temperature has negligible effect on the creep coefficient of the Reactor Building concrete (1). Therefore, it was unnecessary to adjust the sustained Young's modulus for the concrete to account for the increase in normal operating temperature.

QUESTION:

2. Indicate with precision what load combinations have been considered in the analysis, especially whether tornado loads, seismic loads, etc. have been assumed to act simultaneously with the thermal gradients.

RESPONSE:

2. The load combinations which include tornado loads, seismic loads, and other loads considered in the original analysis of the Reactor Building are given in Table 5-2 of the Three Mile Island Nuclear Station Unit 1, Final Safety Analysis Report (FSAR). In essence, all load combinations in Table 5-2 of the FSAR (7, 8, 11 to 14, 17 to 24) related to operating temperature were considered in the reanalysis.

   The change in stresses due to the higher operating temperature was calculated and added to the stresses produced by other loads in the controlling load combinations (combinations 7 and 17 in Table 5-2 of the FSAR).

QUESTION:

3. Indicate the effect of higher operating temperature on the liner. We are particularly concerned about a possible buldging effect on the liner particularly at areas of penetrations, both during normal operation and immediately after a postulated LOCA. Therefore, please provide your analyses displaying stresses and deformations and the results of your inspections during the high temperature conditions.

1/ Three Mile Island Nuclear Station Unit 2, Preliminary Safety Analysis Report, Section 5, Appendix 5J: "Report on Recommended Concrete Creep and Shrinkage Values for Computing Prestressing Losses," page 5J-5.

RESPONSE:

3. The effect of the increase in normal operating temperature of the liner would be an increase in the normal operating stress. No liner bulging is predicted or has been observed as a result of the elevated normal operating temperatures.

   The liner was designed to maintain leak tightness for all load combinations mentioned in the response to question 2, which includes the LOCA. As noted in Nonroutine 30-day Report 75-08, it has been determined that none of the maximum post LOCA temperature and pressure conditions specified in the FSAR would be exceeded. As a result, the increase in normal operating temperature will have no effect on the function of the liner as a leakage barrier during either normal operation or during a postulated LOCA.

   With regard to concerns about possible bulging effects on the liner, the liner anchor design took into account the possibility of bulging as described in the FSAR, page 5-47. Should bulging of the 3/8 inch liner occur, the anchors would remain intact as would the leakage barrier (i.e. the liner). The liner around major penetrations is thickened and stiffened to such an extent as to preclude bulging.