NATHAN M. NEWMARK
CONSULTING ENGINEERING SERVICES

1114 CIVIL ENGINEERING BUILDING
URBANA, ILLINOIS 61801

3 March 1971

Regulatory File Cy.

Received w/Ltr Dated 3-3-71

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COMMENTARY

ON

FINAL SAFETY ANALYSIS REPORT

FOR

THREE MILE ISLAND NUCLEAR STATION -- UNIT 1

METROPOLITAN-EDISON COMPANY AND JERSEY CENTRAL POWER AND LIGHT COMPANY

AEC Docket No. 50-289

by

W. J. Hall, W. H. Walker, and N. M. Newmark

1. Seismic Design Criteria

Earthquake Hazard --

The seismic design for the plant was carried out for a Design Basis Earthquake characterized by 0.12g maximum horizontal ground acceleration to the extent of insuring containment and safe shutdown; also, the design was made for an Operating Basis Earthquake characterized by a maximum horizontal ground acceleration of 0.06g. As noted in our report on the PSAR (Ref. 4), we concur in these design levels for use in the seismic design of this plant.

Buried Piping --

The description of the approach followed by the applicant for buried piping as given on pages 5-76a and 5-76b evidently indicates the manner by which the applicant would have analyzed the piping. Of concern is the matter as to how the applicant handles the piping at points near major structures where it

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runs into the structure and through a wall. The applicant should indicate whether the design that was carried out was such as to provide the necessary ductility at this location through backpacking in the pipe trench and/or wall so as to accommodate the small motions that might be expected between the rock and the structure. Alternatively, if the piping were carried in the pipe tunnel, this should be indicated, as this would provide means of accommodating relative motion.

Reactor Internals --

The analysis procedure followed in the design of the reactor internals, as described on page 3-46 of the FSAR, is that given in Babcock and Wilcox topical report BAW-10008, Part I, Revision I (Ref. 3). The approach followed therein for the analysis of the reactor internals is acceptable to us. It was made for higher levels of base ground acceleration than those for the current plant design. The second topical report, BAW 10008, Part II, Revision I refers to the fuel assemblies stress deflection analyses for loss of coolant accident and seismic excitation (Ref. 3(b)) and in this case the analysis was made for values of earthquake excitation which were lower than those indicated as the design criteria for the plant. The applicant should indicate whether, with an appropriate review of this analysis in terms of the DBE seismic hazard for the plant, this aspect of the design was adequate.

Building Analysis --

The seismic design approach adopted for the buildings is summarized on pages 5-18 and thereafter in the FSAR. It is indicated that the vertical and horizontal seismic components at any point in the shell were added by summing the absolute values of the response (that is, stress, shear, moment, or deflections) of each contributing frequency (sic) due to the vertical motion to the corresponding absolute values of the response of each contributing frequency (sic)

to the horizontal motion. On the assumption that the applicant means each of contributing mode instead of frequency, we believe the approach is satisfactory. In general, the approach adopted for the seismic analysis of the shell follows classical methods and so far as can be ascertained the materials presented in the FSAR are acceptable.

Design Stresses --

The applicant states in Section 5.2.3 that the design of the prestressed reactor building was made such as to have a low strain elastic response for all design loads. The stresses presented in Table 5-3 for various load combinations appear acceptable except that they do not include tabulations for loading conditions 31 and 32, which are for the Design Basis Earthquake. The applicant should indicate whether the stresses and behavior for these loading conditions were found to be acceptable.

Responses Resulting from Vertical Motions --

The statements in FSAR suggest that appropriate amplification was taken into account in the analyses carried out in the design of the structure, and the applicant advises orally that such was the case for both structures and piping. It is assumed that this will be documented in an amendment to be filed shortly.

Piping Analyses --

The general description of the method of dynamic analysis followed for piping systems is given on pages 5-76a and 5-76b. Further amplification is given in the topical report by Gilbert and Associates (Ref. 2). The Gilbert and Associates topical report indicates that the method of Biggs and Roesset was employed for the analyses carried out. We are advised that the floor response spectra which were used in the piping analyses are being regenerated and will be re-examined when they are submitted in the near future. No further

comment on the piping analyses will be made at this time other than to express a desire to examine typical stress values at critical points in certain of the major piping systems for both the DBE and OBE loading combinations, with comparisons with allowable stress values for these conditions.

2. Class II Items of Equipment in Class I Structures

The applicant should indicate whether there are any Class I items located within Class II structures. If so, these should be identified, and the protection provided to insure their ability to function adequately under earthquake excitation should be documented.

3. Critical Items of Control and Instrumentation

The applicant indicates on page 7-2a that the adequacy of critical controls and instrumentation will be documented in report BAW 10003, "Qualification Testing of Protection System Instrumentation". As yet we have not seen this report and no further comment is made at this time.

4. Aircraft Impact Design

The applicant addresses this question in Appendix 5a. We are advised that the applicant is completing an additional evaluation, and our comments will await this submittal.

REFERENCES

1. "Final Safety Analysis Report -- Vol. I through IV, including Amendments 14 and 17," Metropolitan-Edison Company and Jersey Central Power and Light Company, AEC Docket No. 50-289, 1970 and 1971.

2. "Dynamic Analyses of Vital Piping Systems Subjected to Seismic Motion," Gilbert and Associates, Inc., Topical Report No. 1729, May 20, 1970.

3. (a) "Reactor Internal Stress and Deflection due to Loss-of-Coolant Accident and Maximum Hypothetical Earthquake," Babcock and Wilcox Report BAW-10008, Part I, Revision 1, June 1970.

   (b) "Fuel Assembly Stress and Deflection Analysis for Loss-of-Coolant Accident in Seismic Excitation," Babcock and Wilcox Report BAW-10008, Part II, Revision 1, June 1970 (Proprietary).

4. "Adequacy of the Structural Criteria for Three Mile Island Nuclear Station Unit 1," Metropolitan-Edison Company (AEC Docket 50-289), Report to AEC Regulatory Staff by N. M. Newmark and W. J. Hall, December 1967.