UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 41 TO FACILITY OPERATING LICENSE NO. DPR-50

METROPOLITAN EDISON COMPANY

JERSEY CENTRAL POWER AND LIGHT COMPANY
AND
PENNSYLVANIA ELECTRIC COMPANY

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-289

Introduction

By letter dated July 22, 1977, Metropolitan Edison Company (Met Ed) requested amendment of Facility Operating License No. DPR-50 for Three Mile Island Nuclear Station, Unit No. 1 (TMI-1). The requested change would add limiting conditions for operations with respect to air temperatures inside the reactor containment.

Background

By letter dated October 24, 1975, Met Ed transmitted Nonroutine 30-Day Report 75-08 which informed us that during the summer months, temperatures inside the containment at TMI-1 sometimes exceeded the 110°F sustained temperature assumed in the TMI-1 Final Safety Analysis Report (FSAR). Specifically, average temperatures approaching 130°F had been experienced above elevation 320 feet and temperatures in the range of 110°F to 120°F had been experienced below elevation 320 feet, on days when the outside wet bulb air temperature was greater than approximately 75°F. This submittal also presented information supporting the acceptability of the observed temperatures and proposed corrective action. Additional information on this matter was contained in the Met Ed letter of March 25, 1977, which responded to our request of February 17, 1977.

Our letter of May 16, 1977, requested that Met Ed propose technical specifications governing air temperature in the containment patterned after the Standard Technical Specifications for Babcock and Wilcox reactors (NUREG-0103, Revision 1). The present application is in response to this request.

Evaluation

Our review of this matter has included four areas of concern: (1) the effect that increased containment operating temperatures would have on post-LOCA (loss of coolant accident) containment conditions; (2) effect on containment structural integrity; (3) the effect on critical components located within the containment; and (4) the absence of technical specifications requiring surveillance and control of air temperatures inside containment.

1. Effect on Post-LOCA Containment Conditions

In our review of this possible concern, we performed a sensitivity study to determine the effect that the increased containment operating temperature would have on the post-LOCA containment conditions. To conduct this study, four containment pressure and temperature response analyses were performed. In each case, a new initial temperature was assumed to exist throughout the containment.

The initial temperatures utilized were: 90°F, 130°F, 150°F, and 170°F. The results of these analyses indicate that none of the calculated peak accident pressures exceed the containment design pressure of 55 psig. In addition, the calculated peak accident temperature does not exceed the design temperature of 281°F, for those cases where the initial temperature in the containment is below 150°F.

Therefore, the sensitivity study has demonstrated that the magnitude of changes in the calculated peak pressure and temperature due to the differences in the operating temperatures experienced in the TMI-1 containment is insignificant, and that the resultant pressure and temperature in containment would not exceed the design values.

2. Reactor Building Structural Integrity

Our concerns relating to the structural integrity included the following:

a) The methods used by Met Ed for the stress analysis of the structure.

b) The criteria for acceptance of additional stresses generated by the higher thermal loads.

c) The effect of higher temperatures on the prestressing tendons.

d) The effect on the liner and leakage characteristics of the post-LOCA conditions.

Met Ed used the Working Stress Design method of the ACI 318-63 Code, the Ultimate Strength Design method of the same code, and the allowables from the ASME Boiler and Pressure Vessel Code, Section III, Division 2 (Jan. 1, 1975) to determine the structural integrity of the containment. All the loading combinations listed in the FSAR have been considered with temperature stresses due to higher operating temperature added to the stresses generated by other pertinent loads. The effect on tendons is negligible. Met Ed has used in the design of the containment a temperature differential of about 90°F which is not exceeded. Since the compression stresses are slightly increased, explained by an increase in internal temperatures, no additional leakage through the liner is expected. The effect of higher temperatures in the liner during LOCA has been investigated. The liner has had no bulging due to the higher operating temperature.

3. The Effect on Components within the Containment

A detailed study has been made by Met Ed of all safety-related components located in the containment. Met Ed has determined, and we concur, that all components are compatible with the increased operating temperatures. It should be noted that they are located mostly below elevation 320 feet and that at this elevation the operating temperature is only slightly above the design operating temperature: 120°F in lieu of 110°F. This increase is negligible.

4. Technical Specifications

The TMI-1 Technical Specifications do not presently contain surveillance requirements for and limits on air temperature inside containment. Such provisions are necessary, however, to assure the maintenance of containment structural integrity in the event of an accident. Accordingly, we requested Met Ed to propose technical specifications for containment air temperature based on the temperatures we have found acceptable and patterned after the technical specifications issued for similar plants which are currently being licensed. In response to our request, Met Ed proposed technical specifications in general conformance with our guidance. We have made some changes in the proposed technical specifications to provide improved conformity with our model. These changes have been discussed with and accepted by Met Ed.

Environmental Consideration

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: May 24, 1978