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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

AMENDMENT NO. 28 TO FACILITY OPERATING LICENSE NO. DPR-50

METROPOLITAN EDISON COMPANY
JERSEY CENTRAL POWER AND LIGHT COMPANY
PENNSYLVANIA ELECTRIC COMPANY

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-289

Background

By letter dated October 8, 1976, Metropolitan Edison Company (the licensee) requested amendment of the Technical Specifications for Three Mile Island Nuclear Station, Unit No. 1 (TMI-1). The requested changes would increase the setpoint for reactor trip initiated by high reactor coolant system pressure and would increase the relief setting of the ASME Code-required safety valves installed on the pressurizer. The purpose of the proposed change is to reduce the probability of reactor trip following a loss of electrical load (LOEL) transient occurring at full power. Supplementary information in support of this request was provided by the licensee's letters of October 21, 1976 and February 3, 1977.

Prior to the present request the licensee, by letter dated January 16, 1976, requested permission to temporarily increase the high reactor pressure trip setting for test purposes. This request was approved by License Amendment No. 13, dated February 19, 1976. Supplementary information in support of this request was contained in the licensee's letter of February 13, 1976.

Discussion

The purpose of the proposed change is to permit the plant to withstand a loss of electrical load from 100% power without tripping the reactor. Such a change is in the interest of plant safety since it would significantly reduce the magnitude of the transient stresses to which the reactor coolant system would be subjected in the event of a loss of electrical load. It would also preclude unnecessary starting, operation or switching of safety equipment, such as diesel generators, shutdown rods, pumps, valves, etc. In addition, it would contribute to plant safety by allowing the plant to remain in the automatic mode of control down to 15% power, rather than requiring a manual restart from zero power.

When the high reactor coolant pressure trip setpoint is raised it is also necessary to raise the setting of the pressurizer code safety valves in order to maintain the margin between the trip setpoint and the safety valve setting. If the setting of the safety valves is not raised, it would be possible for the safety valves to open prior to reaching the high pressure trip setpoint. The function of the high pressure trip could then be negated by the safety valves, resulting in a water solid pressurizer. The reactor coolant system safety limit pressure of 2750 psig (110% of the design pressure) could then be exceeded.

Based on a request by the licensee contained in his letter of January 16, 1976 and supplementary information provided in his letter of February 13, 1976, License Amendment No. 13 was issued which permitted a temporary increase in the high reactor coolant pressure trip setpoint for the purpose of conducting simulated loss of electrical load tests. The tests indicated that the peak reactor coolant system pressure reached in a loss of electrical load could be 15 psi below the current high pressure trip setpoint. However, since the test was performed with end-of-life reactivity coefficients and since the control systems had been calibrated immediately before the tests, higher system pressures would be expected for other conditions, including beginning-of-life conditions and for control systems operating at their technical specification limits. The tests, therefore, demonstrated that an increased setpoint for the high reactor coolant pressure trip is needed to preclude unnecessary reactor shutdowns as a result of loss of electrical load transients occurring at any point in the operating cycle.

The licensee originally proposed increasing the high reactor coolant pressure (HRCP) trip setpoint in two steps. The first step was to be an increase from the present value of 2355 psig to 2375 psig. The second step was to be an increase in the HRCP trip setpoint to 2405 psig. This increase would only be effected coincident with an increase in the pressurizer code safety valve (PCSV) relief settings from the present value of 2435 psig to 2500 psig. The two step increase in HRCP trip setpoint was proposed because the PCSV relief settings can only be changed during reactor shutdown; and a measure of improvement was desired before the PCSV's could be reset.

However, because approval of the two step increase was not received prior to the TMI-1 shutdown for refueling for Cycle 3, and because the shutdown provides an opportunity for changing the PCSV relief settings, the licensee has indicated that he no longer requests the intermediate settings if the complete change can be made at this time.

Evaluation

The licensee has submitted a number of analyses in support of this request. In his letters of January 16 and February 13, 1976, in support of a request for a temporary increase in the high pressure trip setting, the licensee submitted analyses of rod withdrawal, rod ejection and feedwater line break accidents for both Cycle 1 and Cycle 2 conditions. In his letter of October 8, 1976, in support of the present request for a permanent change in the high pressure trip setting, the licensee submitted a further analysis of the feedwater line break accident for Cycle 2 conditions which corrected a non-conservative safety valve relief rate used in the earlier calculations and which employed more conservative assumptions with respect to instrument setting and/or calibration errors.

The above analyses indicated that during the initial operating cycle, the most severe pressure transient could be produced by a startup accident (i.e. withdrawal of rods from subcritical); and that in subsequent cycles, due to changes in physics properties, the most severe pressure transient could be produced by a feedwater line break.

The calculated peak pressure for the startup accident in the initial cycle with the current high pressure trip setting was 2718 psig. The calculated peak pressure for the feedwater line break accident in Cycle 2, based on the licensee's submittal of October 8, 1976, which assumed the proposed high pressure trip setting of 2405 psig, was 2734 psig. Thus, based on comparing 2718 psig with 2734 psig, the calculations indicate that an increase in the high pressure trip setting to 2405 psig in Cycle 2 does not significantly change the peak pressure from that which could have occurred in Cycle 1 with a high pressure trip setting of 2355 psig. Accordingly, there would be very little change in the pressure-induced stresses to which the reactor coolant system would be exposed. However, by approving this change, the number of instances when the reactor coolant system would be exposed to the stresses imposed by reactor trip would be reduced. We, therefore, conclude that the increase in the high pressure trip setpoint, if implemented in Cycle 2, would not have caused a reduction in safety margin. Such an increase in setting, however, was not approved in sufficient time for implementation in Cycle 2.

By letter dated January 26, 1977, relating to operation in Cycle 3, the licensee requested that this change in high pressure trip setpoint be made applicable to operation in Cycle 3. Based on the data presented in the licensee's January 26, 1977 letter, however, the beginning-of-cycle Doppler and moderator temperature coefficients of reactivity will be slightly less negative for Cycle 3 than they were for Cycle 2. Accordingly, if the analysis submitted by the letter of October 8, 1976, had been performed using Cycle 3 data, rather than Cycle 2 data, it is probable

that a slightly higher peak pressure would have been calculated. However, based on a comparison of the analyses of feedwater line break transients presented in his letter of January 16, 1976, the licensee has estimated that the effect of these slightly less negative coefficients would be to increase the peak pressure by 0.4 psi. We have performed an independent evaluation of the effect of these slightly less negative coefficients on the peak pressure produced by the feedwater line break transient and conclude that the licensee's estimate is reasonable. We, therefore, further conclude that the effect of the difference in the noted coefficients of reactivity between Cycles 2 and 3 is not significant.

Finally, we note that based on conservative calculations the proposed change in high pressure trip setting does not cause violation of the 2750 psig safety limit for the reactor coolant system pressure.

Therefore, based on the foregoing considerations, we conclude that the proposed increase in the reactor coolant system high pressure trip setting and the coincident increase in the relief settings of the pressurizer code safety valves is acceptable for operation in Cycle 3.

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: April 6, 1977