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-39

AND AMENDMENT NO. 38 TO FACILITY OPERATING LICENSE NO. DPR-48

COMMONWEALTH EDISON COMPANY

ZION STATION, UNITS 1 AND 2

DOCKET NOS. 50-295 AND 50-304

Introduction

By letters dated October 26, 1977 and October 5, 1978, Commonwealth Edison Company (the licensee) requested changes to the Technical Specifications appended to Facility Operating Licenses DPR-39 and DPR-48 for Zion Station, Units 1 and 2, respectively. These changes would reduce the maximum pressurizer heatup rate from 200°F per hour to 100°F per hour and incorporate ECCS flow rate surveillance requirements.

Background

Pressurizer Heatup Rate

In August 1977, Mitsubishi Heavy Industries, Ltd., of Japan, noted an inconsistency in the pressurizer heatup rate stated in their Technical Specifications. Specification 3.4.9 required a heatup rate of 200°F/hr; Specification 5.7.1, however, required a heatup rate of 100°F/hr. This discrepancy was reported to the Westinghouse Electric Corporation (Westinghouse), who then reviewed their analysis of the pressurizer heatup rate and determined that the correct heatup rate is 100°F/hr, and that the correct cooldown rate is 200°F/hr; the Technical Specifications for Zion Station stated that pressurizer heatup and cooldown rates were 200°F/hr. Westinghouse then notified the Nuclear Regulatory Commission (the Commission) and the licensee of this problem. The requested amendment would correct the error in the pressurizer heatup rate limit.

ECCS Flow Rate

The High and Low Pressure Safety Injection system (HPSI and LPSI) designs of many Pressurized Water Reactors (PWR) use a common low pressure and a common high pressure header to feed the several cold (and in some cases hot) leg injection points. Maintenance of proper flow resistance and pressure drop in the piping system to each injection point is necessary to: (1) prevent total pump flow from exceeding runout conditions when the system is in its minimum resistance configuration; (2) provide a proper flow split between injection points in accordance with the assumptions used in the ECCS-LOCA analyses, and (3) provide an acceptable level of total ECCS flow to all injection points equal to or above that assumed in the ECCS-LOCA analyses. On many plants, there are motor operated valve(s) in the lines to each injection point that have stops which are set during pre-operational flow testing of the plant to insure that these flow requirements are satisfied. On other plants, electrical or mechanical stops on the Safety Injection System's isolation valve(s) are used for this purpose. The Zion plant uses mechanical stops to satisfy these ECCS flow requirements.

While pre-operational HPSI/LPSI flow testing assured that the valves used to throttle flow have been properly set initially, we have concluded that periodic surveillance requirements are needed to assure that these settings are maintained. Consequently, we requested all PWR licensees to propose appropriate Technical Specification changes to incorporate periodic surveillance requirements for these values. We provided sample surveillance requirements to licensees for guidance in developing proposed changes. Our sample included periodic verification of throttle valve position stop settings, and verification of proper ECCS flow rate whenever system modifications are made that could alter flow characteristics.

Evaluation

Pressurizer Heatup Rate

In designing the pressurizer, Westinghouse performed a thermal stress analysis which analyzed the fatigue resulting from a heatup rate of 100°F/hr and a cooldown rate of 200°F/hr. This analysis meets the standards of the ASME Code, Section III, which requires that the analysis be based on a usage factor. The usage factor represent the

fraction of the fatigue life (the total amount of stress that a particular component is designed to handle), with a usage factor of zero implying that no stress has been exerted on the component, and a usage factor of one implying that the stress exerted on the component is equal to the amount of stress that the component is designed to handle. For any piece of equipment, certain components receive more stress than others. For the pressurizer, this component is the surge nozzle, which has a usage factor of 0.9 for the design numbers listed above. This usage factor is such that if the heatup and cooldown rates used in the analysis were exceeded more than a few times, the actual usage factor for the surge nozzle would exceed 1.0, which is not allowable under the ASME Code. Thus, we conclude that reducing the heatup rate limit from 200°F/hr to 100°F/hr is necessary to maintain thermal stresses in the pressurizer to allowable levels. For the same reasons, we further conclude that the cooldown rate limit presently listed in the Technical Specifications is adequate.

Because the current Technical Specification provision authorized higher rates of pressurizer heatup than the correct limit, the question arose as to whether the correct limit of 100°F per hour has been exceeded in the past. Discussions with Westinghouse indicate that this is unlikely. This is because the system capabilities and Technical Specification limits on the rate of reactor coolant system heatup and pressurization effectively preclude pressurizer heatup rates in excess of 50°F to 75°F per hour. Furthermore, in its letter of October 26, 1977, the licensee indicates that the Zion Station operating procedures have always used 100°F per hour as the maximum heatup rate. Accordingly, we conclude that the only action required by Zion Station is modification of the Technical Specifications to reduce the limiting pressurizer heatup rate of 200°F per hour to 100°F per hour.

On September 25, 1978 Westinghouse was requested to perform an audit review of the stress analyses for components of the reactor coolant pressure boundary to assure that no similar inadvertent error appears in any other portion of the applicable Technical Specifications. By letter dated October 27, 1978 Westinghouse responded by stating that in the past year it had carefully reviewed the stress analysis inputs

to the Technical Specifications for five separate plants and, in addition, is completing a very careful, systematic review on the generic June 15, 1978 version of the Westinghouse Standard Technical Specifications and if any further inconsistencies surface during this review process, suitable action would be taken (in the forum of the Westinghouse STS). We find this response acceptable.

ECCS Flow Rate

The licensee responded to our request with respect to Zion Station by letters dated September 19, 1977, September 8 and October 15, 1978. Based on our review of these licensee submittals, and discussions with the licensee, we have concluded that Zion Station's proposed increased surveillance requirements will provide sufficient additional assurance that proper valve settings for ECCS flows and flow distribution will be maintained throughout plant life; and thus, the proposed changes are acceptable.

Environmental Consideration

We have determined that the amendments will not authorize change in effluent types or total amounts nor an increase in power levels and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendments involve 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 these amendments.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendments do not involve a significant increase in the probability or consequences of accidents previously considered and do not involve a significant decrease in a safety margin, the amendments do 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 these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Date: January 16, 1979