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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ZIRCONIUM-WATER CORRECTION TO THE ECCS ANALYSIS

FOR FACILITY OPERATING LICENSE NO. DPR-70

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

SALEM NUCLEAR GENERATING STATION, UNIT NO. 1

DOCKET NO. 50-272

Introduction

By letter dated February 15, 1979[1] Public Service Electric and Gas Company (the licensee) submitted a reevaluation of the Emergency Core Cooling System (ECCS) performance. This action was taken as a result of the discovery of an error in the Zr-water reaction model in the evaluation model computer codes used in the LOCA analysis[2]. The LOCA reanalysis was performed with the approved February 1978 version of the ECCS evaluation model[3], which included the correction of the error, and with the total core peaking factor, F_Q, of 2.32.

Evaluation

On March 21, 1978 an error was discovered in the Westinghouse ECCS evaluation model. The error involved the calculated heat generation resulting from the Zr-water reaction and affected the calculated cladding temperatures after a LOCA. Following discovery of this error, the licensee administratively reduced the total peaking factor limits for the Salem, Unit 1 plant from F_Q=2.32 to F_Q=2.21. This value F_Q was intended to conservatively accommodate the error. As noted in the Order for Modification of License, issued for the Salem Generating Station Unit 1[4], the NRC conditionally approved the total peaking factor limit of F_Q=2.21, but requested the licensee to provide, as soon as possible, a corrected ECCS analysis. On February 15, 1979 the requested analysis was submitted[1]. The analysis was performed with the NRC approved February 1978 version of the Westinghouse evaluation model[3] which in addition to including the correction of the Zr-water reaction error and several code maintenance and analytical improvements, contained the following changes:

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(a) modification of the input to the containment code,
(b) modified accumulator model,
(c) dynamic steam cooling and
(d) improved 15 x 15 FLECHT heat transfer correlation.

Also, in the analysis, the licensee took credit for paint on some of the containment components, the existence of which would reduce the flow of heat to the containment structure. This assumption decreased the steam condensation rates and resulted in higher calculated containment back-pressures after a LOCA. The limiting value of total core peaking factor, F_Q, used in the analysis was 2.32. The licensee has demonstrated that with this value of F_Q the peak cladding temperature and the local and total Zr-water reactions were within the limits set forth in 10 CFR 50.46. The values of these parameters are listed below:

Peak Cladding Temperature: 2130°F
Local Zr-Water Reaction: 6.1%
Total Zr-Water Reaction: <0.3%

ENVIRONMENTAL CONSIDERATION

We have determined that this action 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 action 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 action.

Conclusion

Based on the review of the submitted document we conclude from the results of the ECCS reanalysis, performed with the previously approved February 1978 version of the Westinghouse evaluation model that operation of Salem Unit 1, at a peaking factor limit of 2.32 will be in conformance with the 10 CFR 50.46 criteria. We consider therefore the ECCS analysis submitted by the licensee acceptable.

Further, we have concluded, based on the considerations discussed above, that: (1) because the termination of the NRC's April 27, 1978 Order for Modification of License relating to the zirconium-water error action does not involve a significant increase in the probability or consequences of accidents previously considered and 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 termination of the April 27, 1978 Order will not be inimical to the common defense and security or to the health and safety of the public.

Date: June 6, 1979

References

1. Letter from Public Service Electric and Gas Company (F. P. Librizzi) to NRC (A. Schwencer), dated February 15, 1979, transmitting ECCS Reanalysis.

2. Letter from Westinghouse Electric Corporation NS-CE-1751 (C. Eicheldinger) to NRC (J. F. Stolz) dated April 7, 1978, transmitting LOCA-ECCS Analysis with Zr/Water Reactor Correction.

3. WCAP-9220-P-A Westinghouse ECCS Evaluation Model, February 1978 Version, February 1978.

4. Letter from NRC (A. Schwencer) to Public Service Electric and Gas Company (F. P. Librizzi), dated April 27, 1978, transmitting Order for Modification of License for Salem Generating Station, Unit 1.