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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 33 TO LICENSE NO. DPR-16

JERSEY CENTRAL POWER & LIGHT COMPANY

OYSTER CREEK NUCLEAR GENERATING STATION

DOCKET NO. 50-219

Introduction

By letter dated May 30, 1978, as supplemented by letters dated June 6, 1978 and October 3, 1978, Jersey Central Power & Light Company (the licensee) requested an amendment to the Technical Specifications of License No. DPR-16 for the Oyster Creek Nuclear Generating Station. The amendment would revise the Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) limits for Exxon Fuel types III E, III F, V, and V B, and would also add a MAPLHGR multiplier. The licensee requested the amendment as a response to an ACRS recommendation (Reference 10) that the ECCS evaluations be performed using a unified model rather than a combination of Exxon and GE calculations.

Discussion

By letter dated May 30, 1978, the licensee proposed to change the MAPLHGR Technical Specifications for the Oyster Creek Nuclear Generating Station using the LOCA analyses performed (Reference 3) with the Exxon Nuclear Company (ENC) WREM based non jet pump-boiling water reactor-emergency core cooling system (NJP-BWR-ECCS) Evaluation Model (References 4, 5, and 6). This model provides relief from restrictive operating limits that resulted from the previous evaluation model and was approved in February, 1977 (Reference 7) contingent upon ENC making two changes to the RELAP4-EM heat transfer model, which have now been completed. These changes relate to: (1) including the use of pressurized water reactor critical heat flux (PWR CHF) correlations (Barnett and Modified-Barnett), with selection and interpolation based on pressure, and (2) excluding the use of the Schrock-Grossman correlation once CHF has been calculated. This proposed Technical Specification change represents the first application of the ENC NJP-BWR-ECCS model to a licensing action.

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Evaluation

The licensee has provided the results (Reference 3) of a spectrum of LOCA break analyses which define MAPLHGR's as a function of burnup for 7x7 and 8x8 ENC fuel in the Oyster Creek core. The MAPLHGR for the GE fuel remaining in the reactor (Type II fuel) is the result of an earlier GE LOCA analysis (Reference 8) and is not affected by this Technical Specification change.

The breaks analyzed in Reference 3 are a guillotine break of 6.292 square feet with discharge coefficients of 0.6 and 0.4, split breaks of 2.5 and 1 square foot, and a small break of 0.35 square feet. All of these cases assumed a break location of the recirculation loop in the pump discharge line on the reactor side of the flow venturi. The worst single failure assumed in the analysis was the failure of the emergency condenser valve to open on the broken recirculation loop. These conditions have been shown to be the most limiting in an earlier analysis (Reference 4).

The effect of break size on peak cladding temperature (PCT) also was determined in an earlier analysis (Reference 4) and was not repeated in the Reference 3 analysis. This is because the model changes involve only changes in core heat transfer logic, so that the basic system blowdown behavior and hence the predicted limiting break size and location should remain unchanged between the two models (Reference 5). We therefore find the use of the previously determined PCT versus break size relationship acceptable in this application.

The guillotine break of 6.292 square feet with a discharge coefficient of 0.4 is the most limiting break. The licensee has calculated MAPLHGR limits based on this break and a center-peaked axial power profile as a function of ENC fuel type and exposure for the Oyster Creek core. A multiplier for MAPLHGR as a function of the location of the axial power peak was determined from axial power profile studies. This multiplier reduces the allowable MAPLHGR commencing at the core centerline and proceeding linearly to the bottom of the core where the multiplier is 0.88. These studies were performed (Reference 4) and approved (Reference 7) in connection with the review of the NJP-BWR-ECCS model. In addition, the calculations were repeated for the present analysis (Reference 3) with the same resultant curve, which therefore remains acceptable.

The new ENC-NJP-BWR-ECCS model calculates credit for continued nucleate boiling for a short time period following a postulated break. At lower initial core flow, this calculated credit might be reduced (i.e. departure from nucleate boiling [DNB] might occur earlier). Therefore, to conservatively bound this potential for earlier DNB, all calculations were performed assuming a 70% initial core flow. This is acceptably conservative for the following reason: The Technical Specification on the APRM flow

biased scram, limits maximum permissible core power as a function of core flow. Below a certain value of steady state flow, operation at full-core power is not permitted. For Oyster Creek, below 80% of full-core flow, operation at full-local power (i.e. 100% fuel bundle power) is not permitted (Reference 9). Reduction of local power reduces the probability of early DNB, so calculations performed below 80% of full flow but at full-local power, are conservative. (They tend to over-predict the occurrence of early DNB). Below 80% of full flow, the reduction in maximum local power, as flow is decreased, more than compensates for any possible tendency toward early DNB due to the flow reduction. Calculations performed at 80% of full flow and 100% local power would, therefore, conservatively bound all possible local power-flow combinations. The calculations that were performed at full-local power and only 70% flow introduce even more conservatism and are therefore acceptable.

The licensee has proposed Technical Specification changes to implement the MAPLHGR and MAPLHGR multiplier limits resulting from the LOCA analysis discussed above. The changes are contained in Reference 2. They consist of a revised Figure 3.10-1, which defines the MAPLHGR limits for all the fuel types presently in the reactor as a function of average planar exposure, and Figure 3.10-2, which defines the MAPLHGR multiplier for Exxon fuel. The revised MAPLHGR limits are higher than previous limits. However, based on the considerations discussed above we have concluded that the proposed changes are derived from approved calculational methods, contain adequate safety margins, and satisfy the requirements of 10 CFR 50, Appendix K and are therefore acceptable.

Environmental Considerations

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) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) 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.

Date: November 11, 1978

References

1. Letter from I. R. Finfrock (Jersey Central Power and Light Company) to E. Case (NRC), October 28, 1976

2. Letter from I. R. Finfrock (JCPL) to E. Case (NRC), May 30, 1978.

3. Exxon Nuclear Company, "Oyster Creek LOCA Analysis Using the ENC NJP-BWR ECCS Evaluation Model," XN-NF-77-55 Revision 1, March 1978

4. Exxon Nuclear Company, "The Exxon Nuclear Company WREN-Based NJP-BWR ECCS Evaluation Model and Application to the Oyster Creek Plant, XN-75-55, Revision 2, August 1976

5. Exxon Nuclear Company, Responses to NRC Questions Concerning NJP-BWR ECCS Evaluation Model and Application to the Oyster Creek Plant, XN-75-55, Revision 2, Supplement 1, September, 1976

6. Exxon Nuclear Company, Supplementary Information Related to the Exxon Nuclear Company WREN-Based NJP-BWR ECCS Evaluation Model and Application to the Oyster Creek Plant, XN-75-55, Revision 2, Supplement 2, December 1976

7. "Safety Evaluation Report by the Office of Nuclear Reactor Regulation Regarding Review of the Exxon Nuclear Company Non-Jet Pump Boiling Water Reactor ECCS Evaluation Model Described in Exxon Topical Reports XN-75-55, Revision 2, Dated August, 1976, XN-75-55, Revision 2, Supplement 1, Dated September, 1976, XN-75-55, Revision 2, Supplement 2, Dated December, 1976, for Conformance to Appendix K to 10 CFR 50," USNRC, February 25, 1977

8. Oyster Creek Nuclear Generating Station, Loss-of-Coolant Accident Analysis Reevaluation and Technical Specification Change Request No. 42, Attachment I, dated December 23, 1975

9. Letter from I. R. Finfrock (JPL) to H. Denton (NRC), Oct. 3, 1978

10. ACRS letter dated March 10, 1975.