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

SAFETY EVALUATION REPORT

VOGTLE ELECTRIC GENERATING PLANT UNITS 1 AND 2

RELATED TO AMENDMENTS NO. 5

TO CONSTRUCTION PERMITS CPPR-108 AND CPPR-109

INTRODUCTION

By letter dated January 11, 1985, Georgia Power Company (GPCo or the licensee), the lead construction agent of the Vogtle Electric Generating Plant, Units 1 and 2, requested amendments to Construction Permits CPPR-108 and CPPR-109, to incorporate the partial Exemption previously requested by the applicant by letter dated April 2, 1984, pertaining to General Design Criterion (GDC) 4 of 10 CFR 50, Appendix A. The partial exemption granted by the Commission will not require the licensee to install jet impingement shields or pipe whip restraints in eight locations per loop in Vogtle, Units 1 and 2 primary coolant piping system, as specified in Enclosure D of the licensee's letter to the Commission dated October 25, 1984. The partial exemption will also not require the licensee to consider dynamic effects associated with the previously postulated breaks. The licensee submitted a value-impact analysis, which, together with the technical information contained in Westinghouse Reports MT-SME-3082 and WCAP-10551, provided a comprehensive justification in support of requesting a partial exemption from the requirements of GDC 4.

EVALUATION

By letter dated February 5, 1985, the applicant was informed that the Commission had granted the Exemption requested, and a copy of the Exemption was enclosed. The exemption became effective upon its date of issuance. The licensee was advised that NRC was processing the requested Construction Permit amendment separately (licensee's January 11, 1985, letter).

The staff's detailed evaluation and basis for granting the partial exemption to the requirements of GDC 4 are delineated in the Exemption enclosed with the staff's February 5, 1985, letter. A summary of the staff's evaluation findings and conclusions immediately follow.

SUMMARY OF EVALUATION FINDINGS

From its evaluation of the analysis contained in Westinghouse Reports MT-SME-3082 and WCAP-10551 for Vogtle, Units 1 and 2, the staff found that the licensee presented an acceptable technical justification, which adequately addressed the staff's evaluation criteria, to: (1) eliminate the need to postulate circumferential and longitudinal pipe breaks in the Reactor Coolant System (RCS) primary loop (hot leg, cold leg and cross-over leg piping); (2) eliminate the need to

install pipe whip restraints and jet impingement shields associated with previously postulated pressure loads, blowdown loads in the RCS and attached piping, and subcompartment pressure loads used to determine pipe support loadings. This finding does not in any way affect the design bases for the containment, the emergency core cooling system, or the environmental qualification for Vogtle. This finding is predicated on the fact that each of the parameters evaluated for Vogtle is enveloped by the generic analysis performed by Westinghouse, contained in Westinghouse Report WCAP-9558, Revision 2, and accepted by the staff in Enclosure (1) to NRC Generic Letter 84-04 (February 1, 1984). Specifically, the NRC determined that:

(1) The loads associated with the highest stressed location in the main loop primary system piping are 1,962 kips (axial), 28,810 in-kips (bending moment) and result in maximum stresses of about 75% of the bounding stress used in Westinghouse Report WCAP-9558, Revision 2. Further, these loads are approximately 70% of those established by the staff as limits (e.g. a moment of 42,000 in-kips in Enclosure (1) to NRC Generic Letter 84-04).

(2) For Westinghouse plants, there is no history of cracking failure in reactor primary coolant system loop piping. The Westinghouse reactor coolant system primary loop has an operating history which demonstrates its inherent stability. This includes a low susceptibility to cracking failure from the effects of corrosion (e.g. intergranular stress corrosion cracking), water hammer, or fatigue (low and high cycle). This operating history totals over 400 reactor-years, including five (5) plants each having 15 years of operation and 15 other plants with over 10 years of operation.

(3) The results of the leak rate calculations performed for Vogtle, using an initial through-wall crack of 7.5 inches, are identical to those of Enclosure 1 to Generic Letter 84-04. The Vogtle plant has an RCS pressure boundary leak detection system which is consistent with the guidelines of Regulatory Guide 1.45, and it can detect leakage of one (1) gpm in one hour. The calculated leak rate through the postulated flaw results in a factor of at least 10 relative to the sensitivity of the Vogtle plant leak detection system.

(4) The margin in terms of load based on fracture mechanics analyses for the leakage-size crack under normal plus SSE loads is within the bounds calculated by the staff in Section 4.2.3 of Enclosure 1 to Generic Letter 84-04. Based on a limit-load analysis, the load margin is about 2.9 and based on the J limit discussed in (6) below, the margin is at least 1.5.

(5) The margin between the leakage-size crack and the critical-size crack was calculated by a limit load analysis. Again, the results demonstrated that a margin of at least 3 on crack size exists and is within the bounds of Section 4.2.3 of Enclosure 1 to Generic Letter 84-04.

(6) As an integral part of its review, the staff's evaluation of the material properties data in Westinghouse Report WCAP-10456 is enclosed as Appendix 1 to the Exemption granted by the Commission. In WCAP-10456, data for ten (10) plants, including the Vogtle units, are presented, and lower bound or "worst case" materials properties were identified and used in the analysis performed in WCAP-10551 by Westinghouse. The applied J for Vogtle in WCAP-10551 was substantially less than 3000 in-lb/in^2. Hence, the staff's upper bound of 3000 in-lb/in^2 on the applied J (refer to Appendix 1 of the Exemption, page 6) was not exceeded.

ENVIRONMENTAL ASSESSMENT

In advance of issuing the Exemption, the Commission published in the Federal Register on January 31, 1985 (50 FR 4605) an "environmental assessment and finding of no significant impact." It was stated in that assessment that the planned Exemption action would not have a significant effect on the quality of the human environment. The Exemption granted involves design features located entirely within the plant restricted area as defined in 10 CFR Part 20; does not affect plant radioactive and non-radioactive effluents; has no other environmental impact; and does not involve the use of resources not previously considered in the Final Environmental Statement (construction permit) for Vogtle, Units 1 and 2.

The staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has determined that these amendments involve no significant hazards considerations. Accordingly, these amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of these amendments.

CONCLUSION

In granting the Exemption, the staff found that the advanced fracture mechanics techniques used by the licensee provided an assurance that flaws in primary system piping will be detected before they reach a size that could lead to unstable crack growth. For this reason, further protection provided by jet impingement shields against the dynamic effects resulting from the discharge from a double-ended guillotine break in the primary piping is unnecessary. Additionally, consideration of such dynamic effects associated with previously postulated pipe breaks is unnecessary. With full protection against dynamic effects provided by advanced analysis techniques, and based on the considerations discussed above, we conclude that: (1) the proposed amendments to Construction Permits CPPR-108 and CPPR-109 permitting the use of the Exemption in construction of Units 1 and 2 do not involve a significant increase in the probability or consequences of accidents previously considered, do not create

the possibility of an accident of a type different from any evaluated previously, do not involve a significant decrease in a safety margin, and thus 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 in compliance with the Commission's regulations, and the issuance of the amendments will not be inimical to the common defense and security, or to the health and safety of the public.

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