June 14, 1985

Docket No.: 50-400

Mr. E. E. Utley
Executive Vice President
Power Supply and Engineering and
Construction
Carolina Power & Light Company
Post Office Box 1551
Raleigh, North Carolina 27602

Dear Mr. Utley:

Subject: Issuance of Amendment to Construction Permit for Shearon Harris Nuclear Power Plant, Unit 1

The Nuclear Regulatory Commission (NRC) has issued the enclosed Amendment No. 4 to Construction Permit CPPR-158 for the Shearon Harris Nuclear Power Plant, Unit 1, located in Wake and Chatham Counties, North Carolina. The amendment is in response to your letters dated January 14, April 19, May 9, and May 31, 1985.

The amendment modifies the construction permit to reflect issuance, by the NRC, of an Exemption dated June 5, 1985. The amendment is effective as of its date of issuance.

A copy of the safety evaluation supporting Amendment No. 4 is enclosed. Also enclosed is a copy of a related notice which has been forwarded to the Office of the Federal Register for publication.

Sincerely,

Original signed by
H. Rood for/

George W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing

Enclosures:
1. Amendment No. 4 to CPPR-158
2. Safety Evaluation
3. F.R. Notice

cc w/enclosures:
See next page

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

CAROLINA POWER & LIGHT COMPANY

NORTH CAROLINA EASTERN MUNICIPAL POWER AGENCY

DOCKET NO. 50-400

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

AMENDMENT TO CONSTRUCTION PERMIT

Amendment No. 4
Construction Permit No.: CPPR-158

1. The Nuclear Regulatory Commission (the Commission) having found that:

   A. The application for amendment filed by Carolina Power & Light Company on behalf of itself and North Carolina Eastern Municipal Power Agency, dated January 14, April 19, May 9, and May 31, 1985 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended, and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   C. The issuance of this amendment is in accordance with the 10 CFR Part 51 of the Commission's regulations, and all applicable requirements have been satisfied.

2. Accordingly, Construction Permit No. CPPR-158 is amended as follows:

   A. Change paragraph 3 to read:

      3. This permit shall be deemed to contain and be subject to the conditions specified in Sections 50.54 and 50.55 of said regulations; is subject to all applicable provisions of the Act, and rules, regulations, and orders of the Commission now or hereafter in effect, except to the extent applicants' obligations thereunder may be modified by duly authorized exemptions; and is subject to the conditions specified or incorporated below:

   B. Change paragraph 3.C to read:

      C. This construction permit authorizes the applicant to construct the facility described in the application and in the hearing record, in accordance with the principal architectural and engineering criteria (except to the extent modification of such criteria may be duly authorized by exemption) and environmental protection commitments set forth therein.

3. This amendment is effective as of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Hugh L. Thompson, Jr., Director
Division of Licensing
Office of Nuclear Reactor Regulation

Date of Issuance: JUN 14 1985

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

SAFETY EVALUATION
SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1
RELATED TO AMENDMENT NO. 4
TO CONSTRUCTION PERMIT CPPR-158

INTRODUCTION

By letter May 31, 1985 which superseded letter dated May 9, 1985, the Carolina Power and Light Company on behalf of itself and the Northern Carolina Eastern Municipal Power Agency (the applicants) requested an amendment to Construction Permit CPPR-158 to incorporate the partial Exemption requested by the applicants by letters dated January 14, April 19, and May 9, 1985, pertaining to General Design Criterion (GDC) 4 of 10 CFR 50, Appendix A. The limited schedular exemption granted by the Commission permits the applicants to eliminate the installation of protective devices and the consideration of the dynamic effects and loading conditions associated with postulated pipe breaks in the three primary loops in the Shearon Harris, Unit 1 primary coolant system for a period ending at the completion of the second refueling outage, pending the outcome of rulemaking on this subject. The January 14, 1985 letter also included an analysis of the occupational radiation dose reduction which constituted a value-impact analysis associated with the exemption request. The value-impact analysis together with the technical information contained in Westinghouse Report WCAP-10699, provide a comprehensive justification in support of requesting a partial exemption from the requirements of GDC 4.

EVALUATION

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 June 5, 1985 letter. A summary of the staff's evaluation, findings and conclusions are immediately below.

SUMMARY OF EVALUATION FINDINGS

From its evaluation of the analysis contained in Westinghouse Report WCAP-10699 for Shearon Harris, Unit 1, the staff found that the applicants presented an acceptable technical justification which adequately addressed the staff's evaluation criteria, to: (1) Eliminate the need to design for pipe whip, jet impingement, and other dynamic effects (including asymmetric effects) of reactor cavity pressurization and primary component subcompartment pressurization due to postulated primary loop pipe breaks, (2) Eliminate the need for pipe whip restraints (including shims) and jet impingement shields associated with the primary loop pipe breaks defined in the Final Safety Analysis Report (FSAR), and (3) Eliminate the dynamic loading effects associated

with the primary loop pipe breaks defined in the FSAR on primary loop piping, branch lines and their supports and maintenance access platforms (branch line postulated pipe breaks are retained for design).

This finding does not in any way affect the design bases for the containment, the emergency core cooling system, environmental qualification, engineered safety features systems response, or the design of the Reactor Coolant System (RCS) heavy components support. This finding is predicated on the fact that each of the parameters evaluated for Shearon Harris, Unit 1 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 1781 kips (axial), 33150 in-kips (bending moment) and result in maximum stresses of about 82% of the bounding stress used by Westinghouse in Reference 1. Further, these loads are approximately 76% of those established by the staff as limits.

(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 leak rate calculations performed for the Shearon Harris plant using an initial through-wall crack of 7.5 inches are identical to those of Enclosure 1 Reference 2. The Shearon Harris 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 Shearon Harris 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 Reference 2. Based on a load-limit analysis, the load margin is about 2.6 and based on the J-limit, 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 4 on crack size exists and is within the bounds of Section 4.2.3 of Enclosure 1 to Reference 2.

(6) As an integral part of its review, the staff's evaluation of the properties data of Reference 3 is enclosed as Appendix I to the Exemption granted by Commission. In Reference 3, data for ten (10) plants are presented and

lower bound or "worst case" materials properties were identified and used in the analysis performed in the Reference 4 report by Westinghouse. The applied J for Shearon Harris in Reference 4 was substantially less than 3000 in-lb/in^2. Hence, the staff's upper bound 3000 in-lb/in^2 on the applied J (refer to Appendix I, page 6) was not exceeded.

ENVIRONMENTAL ASSESSMENT

In advance of issuing the Exemption, the Commission published in the Federal Register on May 28, 1985 (50 FR 21673) 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 Shearon Harris, Unit 1.

The staff has determined that the amendment involves 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 the amendment involves no significant hazards considerations. Accordingly, the amendment meets 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 this amendment.

CONCLUSION

In granting the limited schedular Exemption, the staff found that the advanced fracture mechanics techniques used by the applicants 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 protective devices against the dynamic effects resulting from the discharge from postulated breaks 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 amendment to Construction Permit CPPR-158 permitting the use of the Exemption in construction of Shearon Harris, Unit 1 does not involve a significant increase in the probability or consequences of accidents previously considered, does not create the possibility of an accident of a type different from any evaluated previously, does not involve a significant decrease in a safety margin, and thus 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 in compliance with the Commission's regulations, and the issuance of the amendment will not be inimical to the common defense and security, or to the health and safety of the public.

Date of Issuance: JUN 14 1985

LIST OF REFERENCES

(1) Mechanistic Fracture Evaluation of Reactor Coolant Pipe Containing a Postulated Circumferential Throughwall Crack, WCAP-9558, Rev. 2, May 1981, Westinghouse Class 2 proprietary.

(2) NRC Generic Letter 84-04, "Safety Evaluation of Westinghouse Topical Reports Dealing with Elimination of Postulated Breaks in PWR Primary Main Loops," February 1, 1984.

(3) Westinghouse Report WCAP-10456, "The Effects of Thermal Aging on the Structural Integrity of Cast Stainless Steel Piping for Westinghouse Nuclear Steam Supply Systems," November 1983, Westinhgouse Class 2 proprietary.

(4) Westinghouse Report WCAP-10669, "Technical Bases for Eliminating Large Primary Loop Pipe Ruptures as the Structural Design Basis for Shearon Harris, Unit 1," September 1984, Westinghouse Class 2 proprietary.

ISSUANCE OF AMENDMENT TO CONSTRUCTION PERMIT FOR SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

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