UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

OF ASME CODE CASE N-522

FOR

CAROLINA POWER & LIGHT COMPANY

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT 1

DOCKET NO. 50-400

1.0 INTRODUCTION:

The Technical Specifications for Shearon Harris Nuclear Power Plant (HNP) state that the inservice inspection and testing of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6). 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the specified requirements would result in hardship or unusual difficulties without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements that become effective subsequent to editions specified in 10 CFR 50.55a(g)(2) and (g)(3), except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first ten-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) on the date twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The applicable edition of Section XI of the ASME Code for the HNP first 10-year inservice inspection (ISI) Interval is the 1983 Edition through summer 1983 addenda.

Pursuant to 10 CFR 50.55a(g)(5)(iii), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is impractical for its facility, information should be submitted to the Commission in support of that determination. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose alternative requirements that are determined to be

authorized by law; will not endanger life, property, or the common defense and security; and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed.

By letters dated September 9, 1996, as supplemented January 24, 1997, CP&L requested approval to use ASME Code Case N-522 in lieu of certain system pressure tests and required by ASME Code Section XI for certain containment penetration piping. Code Case N-522, "Pressure Testing of Containment Penetration Piping, Section XI, Division 1" has not been endorsed in Regulatory Guide 1.147, Rev. 11. The staff has reviewed the licensee's request to use the proposed alternative to the Code requirements and provides the following evaluation.

2.0 DESCRIPTION OF RELIEF REQUEST

2.1 Code Requirements

In accordance with IWA-1320(d), Table IWC-2500-1, Category C-H, of the 1983 Edition, periodic system pressure testing is required to be performed on Class 2 piping.

2.2 Components for Which Relief is Requested

This request is for ISI Class 2 system pressure tests to be performed during each remaining ISI inspection interval for piping that penetrates the containment, when the piping and isolation valves that are part of the containment system are Class 2, but the balance of the piping system is outside the scope of Section XI. At HNP, these penetrations include the following: Service Water (M-91, M-92); Sampling (M-88, M-33); Reactor Makeup Water (M-40); Demineralized Water (M-90); Leak Rate Testing (M-62, M-34, M-96); Containment Purge Make-up (M-61); Safety Injection (M-76A, M-76B, M-77A); Spent fuel Pool Cooling (M-44, M-45); Miscellaneous Drains (M-74); Fire Protection (M-79, M-105); Instrument Air (M-80); Service Air (M-41); and Waste gas (M-77C).

2.3 Licensee's Basis for Relief

The piping segment from a non-code class system that penetrates containment is designed and examined as Class 2 piping to protect the integrity of containment. The pressure test requirements in Table IWC-2500-1, Category C-H, verify the leak-tight integrity of Class 2 piping systems or segments utilizing a system pressure test on a once per period frequency and a hydrostatic test on a once per interval frequency.

The Appendix J pressure testing provides periodic verification of the leaktight integrity of the reactor containment and the systems and components that penetrate the containment. The Appendix J test frequency provides assurance of containment pressure boundary integrity by monitoring the deterioration of seals, valves, and piping. Appendix J Option A requires Type B and C tests to be performed during each

refueling outage, but in no case at intervals greatest than 2 years. EST-212, "Local Leak Rate Test Procedure" provides the testing requirements for testing containment penetrations in accordance with Technical Specification 3.6.1.2 at a pressure equal to 41 psig. The use of procedure EST-201, "ASME System Pressure Tests" along with EST-212 ensures a visual examination to verify piping integrity while performing EST-212.

ASME Code Case N-522 was approved December 9, 1993, by the ASME Boiler and Pressure Vessel Code Committee and the Board of Nuclear Code and Standards as an acceptable alternative to the requirements of the ASME Code, Section XI. Consistent with ASME Code Case N-522, this request is based on performing testing in accordance with Appendix J, Option A in lieu of the interval Class 2 system pressure tests for piping that penetrates a containment vessel, when the piping and isolation valves that are part of containment system are Class 2, but the balance of the piping system is outside the scope of Section XI. A review of the ASME pressure tests performed at HNP for the first two inspection periods has determined that no through-wall leaks have been identified during these tests.

2.4 Proposed Alternative Examination

In lieu of performing interval pressure testing, CP&L will perform 10 CFR 50, Appendix J testing in accordance with ASME Code Case N-522. The penetrations identified in this relief will be tested at Pa and in accordance with EST-212. Procedure EST-212 will be revised to include provisions of ASME Section XI, IWC-5210(b) which requires that when air or gas is used as a testing medium, the test procedure shall include methods for locating and detecting through-wall leakages in components of the system being tested. If CP&L chooses to adopt Option B of Appendix J, CP&L will test the applicable penetrations at a two year frequency or the applicable code requirements will be met.

3.0 EVALUATION

The hydrostatic pressure test required in Table IWC-2500-1, Category C-H provides periodic verification of the leak-tight integrity of Class 2 piping systems or segments on a once per period frequency and a hydrostatic test on a once per interval frequency. The pipe segment from a non-code class system that penetrates containment is designed and examined as Class 2 pipe, in order to protect the integrity of containment. The Appendix J pressure testing provides periodic verification of the leak-tight integrity of the primary reactor containment, and systems and components that penetrate containment. The Appendix J tests frequency provides assurances that the containment pressure boundary is being maintained at an acceptable level while monitoring for deterioration of seals, valves, and piping. Appendix J requires that three Type A tests be performed at approximately equal intervals during the 10 year ISI interval, with the third test done while shutdown for the 10-year plant ISI. Appendix J also requires Type B and C tests be performed during each refueling outage, but in no case at intervals greater than 2 years.

The Class 2 containment isolation valves (CIVs) and connecting pipe segment must withstand the peak calculated containment internal pressure (Pa) related to the maximum design containment pressure. The containment penetration piping is classified as Class 2 because of its function as part of the containment pressure boundary, and because containment integrity is the only safety-related function performed by this penetration piping. The staff finds that the pressure retaining integrity of the CIVs and connecting piping and their associated safety functions can be verified with an Appendix J, Type C test if conducted at the peak calculated containment pressure. Therefore, the proposed use of ASME Code Case N-522 to test the penetration piping portion of the associated system to Pa and associated Appendix J criteria is an acceptable alternative to verify the safety function of the affected containment penetration piping and will provide an acceptable level of quality and safety.

Section XI, IWC-5210(b) requires that where air is used as a testing medium, the test procedure shall permit the detection and location of through-wall leakages in components of the system tested. Because an Appendix J, Type C test most likely uses air or gas as a testing medium, the licensee's test procedure should meet the above requirement for the CIVs and pipe segments between the CIVs. In its letter dated January 24, 1997, the licensee commits to test the penetrations identified in this relief in accordance with EST-212. The licensee proposes to revise Procedure EST-212 to include provisions of ASME Section XI, IWC-5210(b) which requires that when air or gas is used as a testing medium, the test procedure shall include methods for locating and detecting through-wall leakages in components of the system being tested. The staff finds the proposal meets the Section XI requirements and therefore, is acceptable.

4.0 CONCLUSION

Based on the above evaluation, the staff concludes that compliance with Appendix J would provide an acceptable level of quality and safety in lieu of the code-required system pressure tests of Class 2 piping that penetrates containment, where the balance of the piping system is non-code class. The use of Code Case N-522 is an acceptable alternative in conjunction with the licensee's proposal that the test is conducted at the peak calculated containment pressure and that the test procedure includes the methods for locating and detecting the through-wall leakages in CIVs and pipe segments between the CIVs. Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee's proposal to use Code Case N-522 (as supplemented) is authorized, with the provisions described above, through the end of the second 10-year inspection interval. Code Case N-522 has not been endorsed in Regulatory Guide 1.147, Rev. 11, and such the use of ASME Code Case N-522 is authorized until such time when it is endorsed in a future revision of Regulatory Guide 1.147. At that time, if a licensee intends to continue to implement this Code Case, it must follow all its provisions in Code Case N-522, with the limitations issued in Regulatory Guide 1.147, if any.

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