



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST 2R2-008 RELATED TO CLASS 2

BOLTED CONNECTIONS IN BORATED SYSTEMS

CAROLINA POWER & LIGHT COMPANY

SHEARON HARRIS NUCLEAR POWER PLANT

DOCKET NO. 50-400

1.0 INTRODUCTION

The Technical Specifications (TS) for the Shearon Harris Nuclear Power Plant (HNP) state that the inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components will be performed in accordance with Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the ASME Boiler and Pressure Vessel Code (ASME Code) and applicable addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Section 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 difficulty 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) will meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, 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 10-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) 12 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 HNP's 2nd 10-year ISI interval is the 1989 Edition.

Pursuant to 10 CFR 50.55a(g)(5), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, information will be submitted to the Commission in support of that determination and a request must be made for relief from the ASME Code requirement. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and/or 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.

Enclosure

By letter dated September 8, 1999, Carolina Power & Light Company (CP&L), the HNP licensee, requested relief from the requirements of ASME Code, 1989 Edition, Section XI, Article IWA-5242(a) with regard to removing insulation from Class 2 pressure-retaining bolted connections in borated systems for VT-2 visual examination during the performance of system pressure testing.

2.0 EVALUATION

2.1 Code Requirement

The ASME Code Section XI, 1989 Edition with no Addenda, IWA-5242(a) requires that for systems borated for the purpose of controlling reactivity, the insulation must be removed from pressure-retaining bolted connections in order to perform VT-2 visual examinations during system pressure testing.

2.2 Code Requirement from which relief is requested (as stated)

Relief is requested from the Code Section XI, IWA-5242(a) requirement for Class 2 pressure retaining bolted connections in borated systems.

2.3 Components for which relief is requested (as stated)

Class 2 pressure retaining bolted connections in systems borated for the purpose of controlling reactivity that are located inside containment.

2.4 Basis for Relief (as stated)

Pursuant to 10 CFR 50.55a(a)(3)(ii), relief is requested on the basis that compliance with the original examination requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Inside containment, the referenced systems are tested in an environment that is hazardous to personnel. Removing and reinstalling insulation under these conditions is difficult to perform and is not consistent with the ALARA [as low as reasonably achievable] concept when compared to the alternate approach. In addition, the removal and reinstallation of insulation is often a critical path activity which directly affects the duration of refueling outages, therefore placing a financial hardship on the plant.

The concern that led to the Section XI requirement for removal of insulation on bolted connections, while performing pressure testing and VT-2 examinations, is that a borated-water leak from a bolted connection could cause corrosion of the bolting materials. The weakening of the bolting could be hidden by the insulation if it were not removed. Thus, the structural integrity of a safety-related system could be compromised by a small leak that could be unnoticed if the insulation remains in place during the pressure testing and VT-2 examination.

This relief request addresses the structural integrity concerns while mitigating the personnel hazards and reducing the critical path impact of the testing. It divides the pressure testing and

the VT-2 examination into two activities that need not be performed at the same time. The proposed alternate examination is supported by the following:

- (a) ASME Code Case N-533 was approved by the Section XI Code Committee, thus providing an alternative to the similar requirement for examination of insulated Class 1 pressure retaining bolted connections.
- (b) By letter dated November 4, 1998 (TAC No. MA0989), the NRC approved HNP relief request 2R1-010 for Class 1 bolted connections.
- (c) Similar relief requests have been approved by the NRC for other nuclear power plants (Virgil C. Summer Nuclear Station and Surry Power Station).
- (d) Pre-existing boric acid leaks will be detected at atmospheric or static pressures due to residue deposits.
- (e) The alternative test will not be applied to post repair/replacement activities on bolted connections.

2.5 Alternative Examinations (as stated)

The following alternate rules for the pressure testing and VT-2 visual examination of Class 2 pressure retaining bolted connections will be used:

- (a) A system pressure test and VT-2 visual examination shall be performed each inspection period without removal of insulation.
- (b) The insulation shall be removed from the bolted connections each inspection period, and a VT-2 visual examination shall be performed. The connections are not required to be pressurized. Any evidence of leakage shall be evaluated in accordance with the requirements specified in HNP relief request 2RG-009, which was approved by the NRC by letter dated November 4, 1998.

[Specifically, relief request 2RG-009 states: "The source of leakage at bolted connections detected by VT-2 examination during system pressure tests shall be located and evaluated for corrective measures. This evaluation will consider the following variables at a minimum: (1) Location of leakage, (2) History of leakage, (3) Fastener materials, (4) Evidence of corrosion, with the connection assembled, (5) Corrosiveness of the process fluid, and (6) Other components in the vicinity that may be degraded due to the leakage.

"When the evaluation of the above variables is concluded and the evaluation determines that the leaking condition has not degraded the fasteners, then no further action is necessary. However, reasonable attempts to stop the leakage shall be taken.

"If the evaluation of the variables above indicates the need for further evaluation, or no evaluation is performed, then a bolt closest to the source of leakage shall be removed. The bolt will receive a VT-1 examination and be evaluated for corrosion in accordance with IWA-3100(a) and dispositioned in accordance with IWB-3140. When the removed bolting shows evidence of

rejectable degradation, all remaining bolts shall be removed and receive a VT-1 examination and evaluation in accordance with IWB-3140. If the leakage is identified when the bolted connection is in service, and the information in the evaluation is supportive, the removal of the bolt for VT-1 examination may be deferred to the next refueling outage.”]

2.6 Staff Evaluation

The Code requires the removal of all insulation from pressure-retaining bolted connections in systems borated for the purpose of controlling reactivity when performing VT-2 visual examinations during system pressure tests. For Class 1 systems, the Code requires this examination each refueling outage, while Class 2 systems are required to receive this examination each inspection period. As an alternative to the Code requirements, the licensee has proposed separating the requirements for a VT-2 examination with insulation removed from the pressure test requirement. The proposed alternative mitigates the safety hazard due to elevated temperatures and excess radiation exposure to plant personnel encountered when adhering to the Code requirement. The proposed alternative is consistent with the requirements of Code Case N-533, "Alternative Requirements for VT-2 Visual Examination of Class 1 Insulated Pressure Retaining Bolted Connections," Section XI, Division 1. The NRC approved the use of this Code Case at HNP for Class 1 systems in relief request 2R1-010 issued on November 4, 1998.

The licensee's proposed alternative for Class 2 systems provides an acceptable approach to ensuring the leaktight integrity of systems borated for the purpose of controlling reactivity. The two-step approach will provide an acceptable level of quality and safety for bolted connections in Class 2 borated systems. The insulated Class 2 bolted connections will still receive pressure testing and VT-2 visual examinations each inspection period. No changes are being made to the areas that are inspected, the inspection criteria, or the VT-2 personnel qualifications. The staff, therefore, finds the proposed alternative acceptable.

3.0 CONCLUSION

Based on the information provided, the staff has determined that the licensee has presented an adequate justification for the relief request from the requirements of ASME Code 1989 Edition, Section XI, Article IWA-5242(a) with regard to removing insulation from Class 2 pressure-retaining bolted connections in borated systems for VT-2 visual examination during the performance of system pressure testing. The staff has determined that compliance with the original examination requirements would result in hardship or unusual difficulty for the licensee without a compensating increase in the level of quality and safety. Therefore, the licensee's relief request 2R2-008 is authorized, pursuant to 10 CFR 50.55a(a)(3)(ii), for the second 10-year interval of the HNP ISI program.

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