



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
OF THE SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN
REQUEST FOR RELIEF SPT-16, REVISION 2
FOR
VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION, UNIT 2
DOCKET NUMBER: 50-339

1.0 INTRODUCTION

The Technical Specifications (TS) for the North Anna Power Station, Unit 2, inservice inspection (ISI) 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 (B&PV) 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)(i). The 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, except the design and access provisions and the pre-service 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 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) 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 North Anna Power Station, Unit 2, second 10-year ISI interval is the 1986 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 shall be submitted to the Commission in support of that determination and a request made for relief from the ASME

ENCLOSURE 1

Code requirement. 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 its letter dated December 7, 1995, Virginia Electric and Power Company (the licensee) submitted a request for authorization to implement Code Cases N-522, *Pressure Testing of Containment Penetration Piping*, and N-535, *Alternative Requirements for Inservice Inspection Intervals*, for North Anna Power Station, Units 1 and 2. However, by letter dated June 10, 1996, the licensee withdrew its request to implement Code Case N-535 for both units and Code Case N-522 for Unit 1. The licensee revised the request for authorization to implement Code Case N-522 for Unit 2 and submitted it as Request for Relief SPT-16. By letter dated February 6, 1997, the licensee submitted Revision 2 to Relief Request SPT-16, providing additional clarification.

2.0 EVALUATION

The staff, with technical assistance from its contractor, the Idaho National Engineering and Environmental Laboratory (INEEL), has evaluated the information provided by the licensee in support of its Second 10-Year ISI Interval Program Plan Request for Relief SPT-16, Revision 2, for North Anna Power Station, Unit 2. Based on the information submitted, the staff adopts the contractor's conclusions and recommendations presented in the Technical Letter Report (TLR).

The licensee has proposed to implement the alternative to Code pressure test requirements contained in Code Case N-522 for Code Class 2 piping and valves at containment penetrations where the balance of the system is outside the scope of Section XI. The licensee proposes to perform the pressure tests in accordance with Appendix J, Option B, and guidance contained in Regulatory Guide 1.163, dated September 1995. In addition, the licensee will supplement the Appendix J leak test by performing the test at peak calculated containment design pressure and incorporating a method for detection and location of leakage. The staff determined that the pressure-retaining integrity of the containment isolation valves (CIVs) and connecting piping and their associated safety functions will be verified with an Appendix J, Type C test if it is conducted at the peak calculated containment pressure as committed by the licensee.

IWC-5210(b) requires that where air or gas is used as a testing medium, the test procedure shall include methods for detection and location of through-wall leaks in system components. An Appendix J, Type C test most likely uses air as a testing medium. Because the licensee's pressure test procedure(s) will include a method to detect and locate potential leakage in CIVs and pipe segments between the CIVs, equivalency to Code requirements is provided.

As an alternative to the test frequency and pressures required by Table IWC-2500-1, Examination Category C-H, Items C7.30, C7.40, C7.60, and C7.70, the

licensee has proposed to 1) implement the alternative contained in Code Case N-522, 2) test the subject containment penetration piping and valves at the peak calculated containment design pressure, and 3) incorporate methods for the detection and location of leakage at containment isolation valves and the pipe segments into the test procedures. Based on the proposed alternative to the Code pressure test requirements, the staff determined that an acceptable level of quality and safety will be provided.

3.0 CONCLUSION

Based on the evaluation of the licensee's proposed alternative, the staff concludes that the proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the licensee's proposed alternative contained in Request for Relief SPT-16, Revision 2, is authorized as requested.

TECHNICAL LETTER REPORT ON THE
SECOND 10-YEAR INTERVAL INSERVICE INSPECTION
REQUEST FOR RELIEF SPT-16, REVISION 2
FOR
VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION, UNIT 2
DOCKET NUMBER: 50-339

1.0 INTRODUCTION

In a letter dated December 7, 1995, the licensee, Virginia Electric and Power Company, submitted a request for authorization to implement Code Cases N-522, *Pressure Testing of Containment Penetration Piping*, and N-535, *Alternative Requirements for Inservice Inspection Intervals*, for North Anna Power Station, Units 1 and 2. On March 28, 1996, a conference call between the NRC and the licensee was held to discuss the implementation of these Code Cases. By letter dated June 10, 1996, the licensee withdrew the request to implement Code Case N-535 for both units and Code Case N-522 for Unit 1. In addition, the licensee revised the request for authorization to implement Code Case N-522 for Unit 2 and submitted it as Request for Relief SPT-16. By letter dated February 6, 1997, the licensee submitted Revision 2 to Relief Request SPT-16, providing additional clarification.

Relief Request SPT-16 is applicable to the second 10-year inservice inspection (ISI) interval, which began December 1990 for North Anna Power Station, Unit 2. The Idaho National Engineering and Environmental Laboratory (INEEL) staff has evaluated the subject request for relief in the following section.

2.0 EVALUATION

The Code of record for the North Anna Power Station, Unit 2, second 10-year ISI interval is the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, 1986 Edition. The information provided by the licensee in support of the request for relief

ENCLOSURE 2

has been evaluated and the basis for disposition is documented below.

Request for Relief SPT-16, Revision 2, Table IWC-5250-1, Examination Category C-H, Items C7.30, C7.40, C7.70, and C7.80, Pressure Testing of Class 2 Components at Containment Penetrations

Code Requirement: Examination Category C-H, Items C7.30, C7.40, C7.70, and C7.80 require a system pressure test each period and a hydrostatic test each interval for piping, pumps, and valves.

Licensee's Proposed Alternative: In accordance with 10 CFR 50.55a(a)(3)(i), the licensee has proposed the following alternative to Section XI Code rules.

"As an alternative to the testing frequency and pressures required by Table IWC-2500-1, Examination Category C-H, Items C7.30, C7.40, C7.60, and C7.70, the subject penetrations and associated piping and valves, will be pressure tested at peak containment calculated pressures to the requirements of 10 CFR Appendix J, as allowed by Code Case N-522. Testing will be performed in accordance with Technical Specification Surveillance Requirement 4.6.1.2 which requires all containment penetrations to be leak rate tested as required by 10 CFR 50, Appendix J Option B, as modified by approved exemptions, and in accordance with the guideline contained in Regulatory Guide 1.163, dated September 1995.

"Methods for the detection and location of leakage at containment isolation valves and the pipe segments between the containment isolation valves will be identified in procedures.

"All subject penetrations will be Type C tested at least once every 60 months."

Licensee's Basis for the Proposed Alternative (as stated):

"The sole safety function of the piping and associated valves listed¹ is to provide containment isolation. The components listed are part of the containment system. The containment penetrations are classified as Class 2 per ANSI 18.2, 'Nuclear Safety Criteria for the Design of

¹The list of piping and valves submitted by the licensee is not included with this evaluation.

Stationary Pressurized Water Reactor Plants', section 2.3.1.2(1). For the subject penetrations the connecting piping beyond the containment isolation valves serves no safety function and is classified as nonclass by the classification criteria used by Virginia Electric and Power Company for North Anna Unit 2.

"The ASME Section XI pressure testing requirements verify leak-tight integrity by an over pressure test every ten years and a nominal operating test every inspection period. The 10-year hydrostatic tests are considered inordinately burdensome for the marginal benefit in safety they provide and have been eliminated by Code Case N-498, 'Alternative Rules for 10-year Hydrostatic Pressure Testing for Class 1 and 2 Systems, Section XI, Division 1', which has been approved by Regulatory Guide 1.147, Inservice Inspection Code Case Acceptability ASME Section XI Division 1.

"The subject penetrations are Type C pressure tested to a peak containment internal pressure of greater than or equal to 44.1 psig. This test is performed to satisfy Technical Specification Surveillance Requirement 4.6.1.2 which requires all containment penetrations to be leak rate tested as required by 10 CFR 50, Appendix J, Option B, as modified by approved exemptions, and in accordance with the guideline contained in Regulatory Guide 1.163, dated September 1995. The testing frequency of 10 CFR 50, Appendix J, Option B is performance based and can vary from 2 years to 5 years or three refueling cycles. This frequency will not coincide with the inspection period frequency required in Table IWC-2500-1 for system pressure tests. Therefore the ASME Code in effect at North Anna will require additional leak tightness testing.

"The ASME Section XI Code has acknowledged that testing of these components beyond the requirements of Appendix J is not necessary and issued Code Case N-522, 'Pressure Testing of Containment Penetration Piping', to define its position."

"NUREG-1493, 'Performance-Based Containment Leak-Test Program', concluded that prescriptive leak rate testing could be replaced with performance based requirements with only a marginal and acceptable impact on safety. The total cost of Type B (electrical penetrations) and TYPE C testing all containment penetrations (approximately 90 penetrations) was estimated to be \$87,500 per outage for North Anna as reported in NUREG-1493. NUREG-1493 estimates that 5% of the total cost of Type B & C testing could be saved if the acceptance criteria were relaxed. Performing ASME Section XI pressure testing beyond the requirements of 10 CFR 50, Appendix J, Option B testing would cause Virginia Electric & Power Company to incur additional cost with a marginal gain in safety."

Evaluation: The licensee has proposed to implement the alternative to Code pressure test requirements contained in Code Case N-522 for Code

Class 2 piping and valves at containment penetrations where the balance of the system is outside the scope of Section XI. The licensee proposes to perform the pressure tests in accordance with Appendix J, Option B, and guidance contained in Regulatory Guide 1.163, dated September 1995. In addition, the licensee will supplement the Appendix J leak test by performing the test at peak calculated containment design pressure and incorporating a method for detection and location of leakage.

The system leakage test required by Examination Category C-H provides periodic verification of the leak-tight integrity of Class 2 piping systems or segments once every 40 months. Pipe segments from non-Code class systems that penetrate containment are designed and examined as Class 2 piping for the sole purpose of verifying the leak-tight integrity of containment. The Appendix J pressure testing provides periodic verification of the leak-tight integrity of the primary reactor containment, and of systems and components that penetrate containment; and provides assurance that the containment pressure boundary is being maintained at an acceptable level while monitoring for deterioration of seals, valves, and piping. Use of Appendix J, Option B results in Type B or C tests being performed at intervals not exceeding 5 years. The Staff has determined that these containment testing frequencies are acceptable, therefore they should also be considered acceptable for the subject piping.

The Class 2 containment isolation valves (CIVs) and connecting pipe segments must withstand the peak calculated containment internal pressure related to the maximum design containment pressure. The containment penetration piping is classified as Class 2 because it is part of the containment pressure boundary, and because containment integrity is the only safety-related function performed by this piping. Therefore, it is logical to test the penetration piping portion of the associated system to the Appendix J criteria. The INEEL staff finds that the pressure-retaining integrity of the CIVs and connecting piping and their associated safety functions will be verified with an

Appendix J, Type C test if it is conducted at the peak calculated containment pressure.

IWC-5210(b) requires that where air or gas is used as a testing medium, the test procedure shall include methods for detection and location of through-wall leaks in system components. An Appendix J, Type C test most likely uses air as a testing medium. Because the licensee's pressure test procedure(s) will include a method to detect and locate potential leakage in CIVs and pipe segments between the CIVs, equivalency to Code requirements is provided.

As an alternative to the test frequency and pressures required by Table IWC-2500-1, Examination Category C-H, Items C7.30, C7.40, C7.60, and C7.70, the licensee has proposed to 1) implement the alternative contained in Code Case N-522, 2) test the subject containment penetration piping and valves at the peak calculated containment design pressure, and 3) incorporate methods for the detection and location of leakage at containment isolation valves and the pipe segments into the test procedures. Based on the proposed alternative to the Code pressure test requirements, the INEEL staff believes that an acceptable level of quality and safety will be provided.

3.0 CONCLUSION

Virginia Electric and Power Company has proposed an alternative to Code pressure test rules for the North Anna Power Station, Unit 2, containment isolation valves and associated containment piping. The licensee proposes to implement Code Case N-522, *Pressure Testing of Containment Penetration Piping*, supplemented by performing the Appendix J pressure test at the peak calculated containment design pressure and by including a method for the detection and location of leakage. Based on the evaluation of the licensee's proposed alternative, the INEEL concludes that the proposed alternative will provide an acceptable level of quality and safety. Therefore, pursuant

to 10 CFR 50.55a(a)(3)(i), it is recommended that the proposed alternative be authorized.