

February 24, 2003

Mr. David A. Christian
Senior Vice President - Nuclear
Virginia Electric and Power Company
5000 Dominion Blvd.
Glen Allen, Virginia 23060

SUBJECT: NORTH ANNA POWER STATION, UNIT 1 - ASME SECTION XI, INSERVICE
INSPECTION PROGRAM - RELIEF REQUEST (RR) RR-IWE9 FOR
CONTAINMENT TESTING (TAC NO. MB7320)

Dear Mr. Christian:

By letter dated January 23, 2003, Virginia Electric and Power Company proposed an alternative to the containment inservice inspection requirements of American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, Subsections IWE and IWL.

Our evaluation and conclusion are contained in the enclosed Safety Evaluation. The NRC staff has concluded that your proposed alternative as described in your request for relief RR-IWE9 provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), your proposed alternative is authorized on a one-time basis following replacement of the reactor vessel head at North Anna, Unit 1.

The NRC staff has completed its evaluation of this request; therefore, we are closing TAC No. MB7320.

Sincerely,

/RA by L Olshan for/

John A. Nakoski, Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-338

Enclosure: As stated

cc w/encl: See next page

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*NLO w/comments

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST RR-IWE9

NORTH ANNA POWER STATION, UNIT 1

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NUMBER 50-338

1.0 INTRODUCTION

By letter dated January 23, 2003, Virginia Electric and Power Company (the licensee) submitted a request for relief from certain inservice inspection (ISI) requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, for North Anna Power Station, Unit 1.

In a separate letter dated January 23, 2003, the licensee announced its plans to replace the reactor vessel head (RVH) at North Anna, Unit 1, during the 2003 outage. The licensee's decision to replace the RVH was based, in part, on the results of the RVH inspection that was performed at North Anna, Unit 2, during the fall 2002 outage. As a result of these inspections, the North Anna, Unit 2, RVH was replaced in January 2003. Based on the similarity in design, materials, and operating history of the North Anna, Unit 2, and North Anna, Unit 1, RVHs, the licensee has also decided to replace the North Anna, Unit 1, RVH. In order to support the replacement of the RVH, the containment concrete and metallic liner will be cut because the existing equipment hatch is not large enough to accommodate the transfer of the RVHs. After the completion of the RVH replacement and containment repair, appropriate leakage testing is required by ASME Section XI to ensure the pressure integrity of the containment.

In lieu of a Type A test required by ASME Code, Section XI, Subsection IWE-5000, the licensee proposed an alternative of a system pressure test at peak calculated containment pressure (Pa) followed by a local leak rate test to verify the leaktight integrity of the containment repairs. The licensee, in its submittal, stated that a local leak rate test rather than a Type A test is the appropriate test to perform on the metallic liner repair. The licensee indicated that the pre-test and post-test activities associated with a Type A test are far more involved and time consuming than the proposed local leak rate test, and the Type A test provides no additional quality or accuracy.

2.0 REGULATORY EVALUATION

In the *Federal Register* dated August 8, 1996, the Commission amended Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a to incorporate by reference the 1992 Edition through the 1992 Addenda of the ASME Code, Section XI, Subsections IWE and IWL. Subsection IWE provides the requirements for ISI of Class MC (metallic containment components) and the metallic liner of Class CC (concrete containment components).

Subsection IWL provides the requirements for ISI of Class CC components. The Code of record for North Anna, Unit 1, is the 1992 Edition with the 1992 Addenda.

The regulations require that ISI of certain Code Class MC and CC components be performed in accordance with Section XI of the ASME Code and applicable addenda, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (g)(6)(i) of 10 CFR 50.55a. In proposing alternatives or requesting relief, the licensee must demonstrate that (1) the proposed alternatives provide an acceptable level of quality and safety, (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety, or (3) conformance is impractical for its facility.

By letter dated January 23, 2003, the licensee submitted an alternative to the ASME Code, Section XI, ISI requirements pursuant to 10 CFR 50.55a(a)(3)(i). Specifically, in RR-IWE9, the licensee proposed an alternative to the leakage test requirements of ASME Code, Section XI, paragraph IWE-5221. In lieu of performing a Type A test following a major containment repair, the licensee proposed to perform an "as-left" local leak rate test on the containment liner repair following a containment system pressure test. The NRC staff's evaluation and findings on the licensee's proposed alternatives are provided below.

3.0 TECHNICAL EVALUATION

In order to accomplish the RVH replacement, a portion of the North Anna, Unit 1, containment concrete, reinforcing steel, and metallic liner will be removed. After the RVHs are moved through the newly created containment access, the metallic liner section will be reattached by welding. Subsequent to reattaching the liner, the reinforcing steel and concrete will be replaced. Following the liner repair and concrete replacement, appropriate leakage testing in accordance with ASME Section XI is required to verify the integrity of the repairs and to return the containment and metallic liner to operable status. Specifically, paragraph IWL-5200 requires a system pressure test at Pa following concrete repair or replacement in order to verify the structure integrity of the concrete placement, and paragraphs IWE-5221 and IWL-5230 require an appropriate leakage test to verify the leaktight integrity of containment liner repair. Paragraph IWL-5230 requires testing as delineated in IWE-5221.

Paragraphs IWE-5221 and IWL-5230 state that repairs and any major modification, replacement of a component that is a part of the primary reactor containment boundary, or resealing a seal welded door, performed after the pre-operational leakage rate test shall be followed by either a Type A, Type B, or Type C test as applicable for the area affected by the modification. Depending on the containment area affected and extent of the repair or modification, the licensee must determine what type of leak rate test is appropriate. A review of containment repair activities at North Anna, Unit 1, indicates that a Type A test may be the most appropriate leakage test because of the magnitude of repair and its potential impact on the containment structural integrity. In general, a Type A test provides useful information about the overall condition of containment and total leakage but would not provide the required information for the specific areas affected by the repair. In order to evaluate and demonstrate the effectiveness and leaktightness of liner repair and welds, a local leak rate test (Type B) may be necessary and sufficient.

However, in lieu of performing either a Type A or a Type B test as required by IWE-5221, the licensee proposes an alternative test that meets the intent of Code requirements to ensure the containment pressure and structural integrity are maintained following repairs, replacements, or modifications. The proposed alternative involves performing a system pressure test of the containment followed by a local leak rate test of the liner repair weld areas. The system pressure test will ensure the overall acceptability of the containment structural integrity and repaired welds. As a part of the proposed test, the licensee will perform a 100-percent visual (VT-1C) examination of the exterior surface of the new concrete prior to, during, and following pressurization. The section of metallic liner that was removed will be rewelded in place in accordance with the original owner's requirements. As a minimum, 100-percent surface (liquid penetrant or magnetic particle) and spot volumetric examination will be performed on the pressure boundary containment metallic liner repair welds. In addition, a general and VT-3 visual examination of the new metallic liner pressure boundary weld will be performed in accordance with ASME Code Section XI requirements. Following the completion of the containment pressure test, the metallic liner repair weld will be tested by a local leakage test using a test channel over the new welds. The local leak rate test will be performed in accordance with the standard methods and acceptance criteria as delineated in American National Standards Institute (ANSI)/American Nuclear Society (ANS) 56.8, "Containment System Leakage Testing Requirements." Prior to the containment pressure test, the metallic liner repair weld will also be vacuum-boxed tested and the channel attachment welds will be snoop tested with soap bubbles. These local leakage tests will ensure the leaktightness of test channel and welds.

The NRC staff finds that the proposed system pressure test of the containment at Pa will satisfactorily structurally test the metallic liner repair weld and the newly placed concrete, and the associated inspections will demonstrate the acceptability of the general condition of the containment structure as well as the leaktight integrity of the repaired containment under a design-basis accident. The NRC staff also finds that the proposed local leak rate test and vacuum test will demonstrate the leaktight integrity of the liner repair weld and test channel.

4.0 CONCLUSION

On the basis of the above evaluation, the NRC staff concludes that the proposed alternative meets the intent of both IWE-5221 and IWL-5230, and will satisfactorily test the structure as well as ensure the leaktight integrity of the containment repair. Therefore, the NRC staff concludes that RR-IWE9 provides an acceptable level of quality and safety. Pursuant to 10 CFR 50.55a(a)(3)(i), RR-IWE9 is authorized on a one-time basis following replacement of the RVH at North Anna, Unit 1.

Principal Contributor: S. Monarque, DLPM

Date: February 24, 2003

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