May 1, 2003

Mr. David A. Christian
Sr. Vice President and Chief Nuclear Officer
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Blvd.
Glen Allen, Virginia 23060-6711

SUBJECT: SURRY POWER STATION, UNITS 1 AND 2 - ASME SECTION XI, INSERVICE INSPECTION PROGRAM - RELIEF REQUEST RR-IWE9 FOR CONTAINMENT TESTING (TAC NOS. MB7797 AND MB7798)

Dear Mr. Christian:

By letter dated February 24, 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, for Surry Power Station, Units 1 and 2.

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, provides an acceptable level of quality and safety. Therefore, pursuant to Title 10 of the *Code of Federal Regulations,* Section 50.55a(a)(3)(i), your proposed alternative is authorized on a one-time basis following replacement of the reactor vessel heads at Surry Power Station, Units 1 and 2.

The NRC staff has completed its evaluation of this request; therefore, we are closing TAC Nos. MB7797 and MB7798.

Sincerely,

/RA/

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

Docket Nos. 50-280 and 50-281

Enclosure: As stated

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST RR-IWE9

SURRY POWER STATION, UNITS 1 AND 2

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NOS. 50-280 AND 50-281

1.0 INTRODUCTION

By letter dated February 24, 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 (Code), Section XI, for Surry Power Station, Units 1 and 2.

In a separate letter dated January 23, 2003, the licensee announced its plans to replace the reactor vessel heads (RVHs) at Surry Power Station, Units 1 and 2, during the planned 2003 spring and fall outages. The licensee's decision to replace the RVHs at the Surry Power Station was based, in part, on the results of the RVH inspection performed at North Anna, Unit 2, and the similarity in design, materials, and operating history of North Anna, Unit 2, when compared with Surry, Units 1 and 2. The licensee replaced the North Anna, Unit 2, RVH based on the as-found condition of the head during the aforementioned inspection. In order to support the replacement of the Surry RVHs, the containment concrete and metallic liners for each unit will be cut because the existing equipment hatch is not large enough to accommodate the transfer of the RVHs. After the completion of each RVH replacement and associated containment repair, appropriate leakage testing is required by ASME Section XI to ensure the pressure integrity of the containment.

In lieu of the Type A test required by the ASME Code, Section XI, Subsection IWE-5221, for this type of repair, the licensee proposed to perform local leak rate tests (LLRTs) to verify the leaktight integrity of the repaired metallic liners. The LLRT would follow a containment pressure test in each unit designed to verify containment integrity. The licensee stated that an LLRT is a superior test compared with the Type A test for determining leakage in the repaired area. The licensee stated that Type A testing is less sensitive than the LLRT and unnecessary given the planned repair activities associated with the RVH replacement and the nondestructive examination and alternative testing that is also being proposed.

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 ASME Code of record for Surry, Units 1 and 2, is the 1992 Edition with the 1992 Addenda.

The regulations require that ISI of certain ASME 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.

3.0 TECHNICAL EVALUATION

In order to accomplish the RVH replacement, a portion of each unit's containment concrete, reinforcing steel, and metallic liners will be removed. After the RVHs are moved through the newly created containment accesses, the metallic liner sections will be reattached by welding. Subsequent to reattaching the liner, the reinforcing steel and concrete for each unit will be replaced. Appropriate leakage testing in accordance with Section XI of the ASME Code is then required to verify the integrity of the repairs and to return the containments and metallic liners to operable status. Specifically, paragraph IWL-5200 requires a system pressure test at accident pressure (Pa) following concrete repair or replacement in order to verify the structural integrity of the concrete placement, and paragraph IWE-5221, by reference to paragraph IWE-5000 in paragraph IWL-5230, requires that an appropriate leakage test be performed to verify the leaktight integrity of containment liner repair.

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 Surry, Units 1 and 2, 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 the effectiveness of welds used to repair the containment liner and demonstrate their leaktightness, a local leak rate test (Type B) may be more appropriate.

However, in lieu of performing either a Type A or a Type B test as required by IWE-5221, the licensee proposes an alternative combination of tests that it believes meets the intent of the ASME Code requirements to ensure the structural integrity and the leaktightness of the containment are maintained following repairs, replacements, or modifications. The proposed alternative involves performing a system pressure test of the containment at Pa followed by a local leak rate test of the liner repair weld areas.

For each unit, the licensee proposed the following inspections and tests. The section of metallic liner that was removed will be rewelded in place in accordance with the original owner's requirements. This liner is part of the containment's pressure boundary. As a minimum, the licensee will perform 100-percent surface (liquid penetrant or magnetic particle) and spot volumetric examinations on the repair welds made to the metallic liner. In addition, the licensee will perform a general visual and a VT-3 examination of the new metallic liner pressure boundary welds in accordance with ASME Code Section XI requirements.

Prior to replacement of the concrete, the licensee will visually examine the outside of the metallic liner, the reinforcing steel, and existing concrete to ensure proper surface preparation. The licensee will perform a VT-1 visual examination of the reinforcing steel, and any repair or replacement of reinforcing steel will meet the original owner's requirements or ASME Section III, Division 2. After placement of the concrete, the containment system will be pressure tested at Pa, defined as 44.1 to 45 psi for a minimum of 1 hour, to ensure the overall acceptability of the containment structural integrity and repaired welds. As a part of the proposed system pressure 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.

After completion of the containment pressure test, the licensee will perform an LLRT of the metallic liner repair weld. The LLRT 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." Initially, a vacuum test of the metallic liner repair weld will be performed. The licensee proposed to measure the leakage along the repair weld using a test channel attached to the liner. The licensee's acceptance criteria for the LLRT will be zero leakage from the repair weld.

The licensee stated that concrete, steel, and liner inspections and examinations will be performed using personnel qualified to perform those inspections and examinations.

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

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 RVHs at Surry, Units 1 and 2.

Principal Contributor: C. Gratton, DLPM

Date: May 1, 2003

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Surry Power Station
Units 1 and 2

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