

October 2, 2000

Mr. David A. Christian  
Senior Vice President - Nuclear  
Virginia Electric and Power Company  
5000 Dominion Blvd.  
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SUBJECT: NORTH ANNA POWER STATION UNITS 1 AND 2, AND SURRY POWER  
STATION UNITS 1 AND 2, RE: ASME XI INSERVICE INSPECTION (ISI)  
PROGRAM RELIEF REQUESTS, CODE CASES N-532 AND N-619 (TAC NOS.  
MA6878, MA6879, MA6880, AND MA6881)

Dear Mr. Christian:

This letter grants the relief you requested for Code Case N-532 and denies the relief you requested for Code Case N-619.

In a letter dated October 12, 1999, as supplemented April 26, 2000, Virginia Electric and Power Company (VEPCO) requested relief from certain ISI requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. VEPCO proposed to use Code Cases N-532, "Alternative Requirements to Repair and Replacement Documentation Requirements and Inservice Summary Report Preparation and Submission as Required by IWA-4000 and IWA-6000," and N-619, "Alternative Requirements for Nozzle Inner Radius Inspections for Class 1 Pressurizer and Steam Generator Nozzles."

Our evaluations and conclusions are contained in the enclosed Safety Evaluation. Your request to use Code Case N-532 is authorized pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.55(a)(3)(i), based upon a determination that the proposal provides an acceptable level of quality and safety. With regard to ASME Code Case N-619, the staff does not have sufficient basis to authorize its use. Westinghouse Owners Group has been requested to perform risk assessments using probabilistic fracture mechanics along with monitoring by an enhanced visual examination to demonstrate an acceptable level of quality and safety. Therefore, use of Code Case N-619 is not authorized.

David A. Christian

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The staff has completed its evaluation of these requests; therefore, we are closing TAC Nos. MA6878, MA6879, MA6880, and MA6881.

Sincerely,

***/RA/***

Richard L. Emch, Jr., Chief, Section 1  
Project Directorate II  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-280, 50-281, 50-338, and 50-339

Enclosure: As stated

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO CERTAIN INSERVICE INSPECTION REQUIREMENTS

NORTH ANNA POWER STATION, UNITS 1 AND 2  
SURRY POWER STATION, UNITS 1 AND 2

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NOS. 50-280, 50-281, 50-338, AND 50-339

1.0 INTRODUCTION

By letters dated October 12, 1999, and April 26, 2000, Virginia Electric and Power Company (the licensee) requested relief from certain inservice inspection (ISI) requirements at North Anna Power Station, Units 1 and 2, and Surry Power Station, Units 1 and 2. The licensee proposed implementing the rules from the American Society of Mechanical Engineers (ASME) Code Case N-532, "Alternative Requirements to Repair and Replacement Documentation Requirements and Inservice Summary Report Preparation and Submission as Required by IWA-4000 and IWA-6000," and Code Case N-619, "Alternative Requirements for Nozzle Inner Radius Inspections for Class 1 Pressurizer and Steam Generator Nozzles," as alternatives to the ASME Code (the Code) requirements. Code Case N-532 reduces the burden of paperwork and reports a licensee must complete, and Code Case N-619 eliminates inspection requirements of the pressurizer and steam generator (SG) nozzle inner radii.

2.0 BACKGROUND

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) must meet the requirements, except design and access provisions and preservice examination requirements, set forth in Section XI of editions of the Code and addenda that become effective subsequent to the editions specified in paragraph 10 CFR 50.55a(g)(2) and that are incorporated by reference in paragraph 10 CFR 50.55a(b), to the extent practical within the limitations of design, geometry, and materials of construction of the components.

2.1 Request for Approval of an Alternative

Pursuant to 10 CFR 50.55a(a)(3), proposed alternatives to the requirements of paragraphs (c), (d), (e), (f), (g), and (h) of 50.55a or portions thereof may be used when authorized by the NRC. The applicant shall demonstrate that: (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements of 50.55a would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

### 3.0 CODE CASE N-532

*“Alternative Requirements to Repair and Replacement Documentation Requirements and Inservice Summary Report Preparation and Submission as Required by IWA-4000 and IWA-6000.”*

#### 3.1 Code Requirements

North Anna Unit 1 is currently completing the second inspection interval using the 1983 Edition with Summer 1983 Addenda of ASME Section XI, and has started the third interval using the 1989 Edition of ASME Section XI. North Anna Unit 2 is currently completing the second inspection interval using the 1986 Edition of ASME Section XI. Surry Units 1 and 2 are currently in the second period of the third inspection interval, and both are using the 1989 Edition of ASME Section XI. Surry Unit 1 has an approved risk-informed, ultrasonic testing (UT) ISI program for piping, which creates reports on high safety significance piping, regardless of Code classification, in addition to the Code requirements. Each of these programs currently reports ASME Section XI repairs, replacements, and ISI in accordance with IWA-4000, IWA-6000, and IWA-7000 with the exception of the Surry 1 risk-informed program. Specifically, IWA-4800 states that the records required by IWA-6000 shall be completed for all repairs. IWA-6210 requires the licensee to prepare ISI summary reports for Class 1 and Class 2 pressure-retaining components and their supports. IWA-6220 requires ISI summary reports to be prepared at the completion of each inspection conducted during a refueling outage that includes examinations, tests, replacements, and repairs conducted since the preceding summary report. IWA-6220(d) requires, among other things, that each ISI summary report include “Owner’s Report for Repairs or Replacement,” Form NIS-2, as shown in Appendix II to Section XI of the Code. IWA-6230 requires that the ISI summary report be sent to the enforcement and regulatory authorities within 90 days after completing the ISI that was conducted during the refueling outage. IWA-7520 requires that reports and records on replacements be maintained, as applicable; among other things, the reports shall include Form NIS-2.

#### 3.2 Proposed Alternative

The licensee proposed to use ASME Code Case N-532 with a clarification as an alternative. The clarification is to the term “corrective measures,” which pertains to repair and replacement activities and not routine maintenance activities. The proposed alternative will apply to North Anna Unit 1 for the second and third inspection intervals, North Anna Unit 2 for the second inspection interval, and Surry Units 1 and 2 for the third inspection interval.

#### 3.3 Licensee’s Basis for the Proposed Alternative

Pursuant to 10 CFR 50.55a, relief is requested on the basis that the proposed alternative provides an acceptable level of quality and safety.

Code Case N-532 provides alternative reporting requirements that reduce the administrative burden placed upon a nuclear unit by current ASME Code requirements. These reports are currently required within 90 days following completion of a refueling outage. The alternative provided by Code Case N-532 extends reporting requirements from each outage to each period

within an ISI interval, which means three times in 10 years. Additionally, the alternative only requires a summary report of the interval inspection status and significant events. The licensee believes that submitting reports to the NRC three times per interval will provide them with some efficiency in reporting.

The clarification to the term "corrective measures" pertains to repairs and replacements. The term "corrective measures" may also involve maintenance activities such as tightening threaded fittings to eliminate leakage, torquing of fasteners to eliminate leakage at bolted connections, replacing valve packing due to unacceptable packing leakage, tightening loosened mechanical connections on supports, adjustment and realignment of supports, cleanup of corrosion on components from leakage, etc. The clarification is intended to exclude these types of routine servicing of components from the term "corrective measures" as it pertains to Code Case N-532. The Code-required activities such as repair and replacement would be applicable to Code Case N-532 paragraph 2(c).

### 3.4 Evaluation

The licensee proposed the alternative to use Code Case N-532 with a clarification of the term "corrective measure." The clarification is to differentiate how the Code uses the term, "corrective measures." One distinction involves repair and replacement activities, and the second involves maintenance activities that are separate from repair and replacement activities. The licensee proposes to report repair and replacement activities and not report routine maintenance activities, such as tightening threaded fittings to eliminate leakage, torquing of fasteners to eliminate leakage at bolted connections, replacing valve packing due to unacceptable packing leakage, tightening loosened mechanical connections on supports, adjustment and realignment of supports, cleanup of corrosion on components from leakage, etc.

Code Case N-532 condenses the detailed Form NIS-2 report to a sign-off report "Repair/Replacement Certification Record," Form NIS-2A, with traceability to the work package that was used for the repair or replacement of the component. The work package provides detailed information of the work performed, which would normally be summarized on the NIS-2. Hence, the data normally reported on the NIS-2 would be developed from the information available from the NIS-2A and the work package.

Code Case N-532 also extends the reporting time for ISI summary reports from each refueling outage to each inspection period. Code Case N-532 requires an "Owner's Activity Report," Form OAR-1, be completed after each refueling outage. OAR-1 condenses the data required by IWA-6210(c), (d), and (e); IWA-6220; and IWA-6230(b), (c), and (d). These OAR-1 forms will continue to be completed after each refueling outage and will be submitted to the regulatory and enforcement authorities after the end of the inspection period, i.e., three times per 10-year interval.

The reduction of these reporting requirements is an administrative change and, as such, does not effect the design or operational parameters of either Surry or North Anna. The record keeping requirements of OAR-1 will not be affected, and the records will be available for inspection by the staff. Therefore, Code Case N-532 provides an acceptable level of quality and safety.

### 3.5 Conclusion

The staff has determined that the proposed alternative documentation requirement of Code Case N-532 would provide an acceptable level of quality and safety. Therefore, the use of Code Case N-532 is authorized pursuant to 10 CFR 50.55a(a)(3)(i) at both units of North Anna and Surry for their respective second and third 10-year ISI intervals.

### 4.0 CODE CASE N-619

*“Alternative Requirements for Nozzle Inner Radius Inspections for Class 1 Pressurizer and Steam Generator Nozzles”*

The use of Code Case N-619 would eliminate the volumetric examinations of inside radius sections of the pressurizer and of the primary SG nozzles (Table IWB-2500-1, Examination Category B-D, Item Numbers B3.120 and B3.140, Inspection Program B).

#### 4.1 Code Requirements

North Anna Unit 1 is currently completing the second inspection interval using the 1983 Edition with Summer 1983 Addenda of ASME Section XI and has started the third interval using the 1989 Edition of ASME Section XI. North Anna Unit 2 is currently completing the second inspection interval using the 1986 Edition of ASME Section XI. Surry Units 1 and 2 are currently in the second period of the third inspection interval, and both are using the 1989 Edition of ASME Section XI. A volumetric examination is required each interval for SG and pressurizer primary nozzle inside radius sections (Table IWB-2500-1, Examination Category B-D, Item Nos.: B3.120 and B3.140, Inspection Program B).

#### 4.2 Proposed Alternative

The licensee proposes to implement Code Case N-619 for the North Anna Units 1 & 2, and Surry Units 1 & 2, for ISI of the inner nozzle radii of the SGs and pressurizers. Approval for use of the Code case would supersede previously approved relief requests that substituted visual examinations in lieu of volumetric examinations for the nozzle inside radius sections. This Code case would not affect the Code-required pressure testing and VT-2 examinations

#### 4.3 Licensee's Basis for the Proposed Alternative

Code Case N-619 provides an alternative to the Code-required ISI of nozzle-to-vessel inner radii by eliminating the inspection. The justification for the alternative is contained in a technical paper that was presented to ASME in support of Code Case N-619, which is attached to the licensee's submittal dated October 12, 1999.

#### 4.4 Evaluation

The licensee's proposed alternative to use Code Case N-619 would eliminate the volumetric examinations of inside radius sections of the pressurizer and of the primary SG nozzles. Further, implementation of this Code case beginning with the current interval would also eliminate inspection commitments made by the licensee in prior alternatives that were authorized by the staff. These alternatives are summarized in Table 1 of this Safety Evaluation.

Code Case N-619 draws upon the past industry experience related to volumetric examination of nozzle inner radii of the pressurizer and the SG primary nozzles. The inspection results obtained over the past 25 years have not shown evidence of cracking in the nozzle inner radii region. The Westinghouse Owners Group (WOG) has performed structural integrity evaluations covering the nozzle geometries of the SG and the pressurizer to demonstrate that the subject nozzles have a large tolerance for flaws. However, during discussions with the WOG, the staff has indicated that the risk assessments using probabilistic fracture mechanics regarding pressurizer and SG nozzles are not at the same level of completeness, for example, with respect to potential initiating events, as those developed for reactor vessel inspection. WOG has agreed to expand the probabilistic analysis for the pressurizer and the SG nozzles. Furthermore, the staff does not believe that the Code Case N-619 proposal to eliminate volumetric examination of inner radius without monitoring by an enhanced visual examination would provide an acceptable level of quality and safety. Some type of monitoring for initiating cracks is needed to prevent the development of throughwall leaks. An enhanced visual examination can detect small cracks and even scratches. Therefore, the staff has two objections to the use of Code Case N-619 at Surry and North Anna. First, the WOG analyses for pressurizer and SG nozzles have not been carried to a sufficient level of completeness, especially with regard to potential crack initiating events. Second, no method is provided to monitor initiating cracks. Based on the staff's view that the Code Case N-619 as currently written does not provide an acceptable level of quality and safety, use of Code Case N-619 at Surry and North Anna is not authorized.

As shown in Table 1 for the second inspection interval of North Anna Units 1 and 2 and for the third inspection interval of Surry Units 1 and 2, VT-1 visual examination of the SG nozzle-to-vessel inner radius and VT-2 visual examination of the pressurizer-to-nozzle inner radius have been approved in lieu of ultrasonic examination. The staff concludes that these visual examinations of inner radii continue to provide reasonable assurance of structural integrity as an alternative to the current ASME Code requirements.

#### 4.5 Conclusion

The staff concludes that the licensee's proposed alternative to use Code Case N-619 in lieu of the Code requirements does not provide an acceptable level of quality and safety, and is, therefore, not authorized. This conclusion regarding the use of Code Case N-619 does not revoke the previously approved alternatives for these components discussed in Table 1 of this document.

Table 1. Summary of previously granted relief requests for the same items in this relief request.

Plant	ISI Interval	Item Identification	Alternative *	Reason for Request	NRC's Disposition
North Anna, Unit 1	second	SG nozzle-to vessel inside radius	VT-1	The licensee believes that a mockup of their channel head configuration is needed in order to develop an effective UT procedure, to perform calibrations, and to conduct training. The licensee stated that the SG would be replaced before a mockup could be purchased and delivered.	Granted in Safety Evaluation dated April 7, 1992
North Anna, Unit 1	second	PZR surge nozzle-to-vessel inside radius	VT-2	The licensee believes that any gains in system integrity from UT over VT-2 cannot be justified by the increase in radiation exposure to personnel working in an area with limited access and maneuverability.	Granted in Safety Evaluation dated April 7, 1992
North Anna, Unit 2	second	SG nozzle-to vessel inside radius	VT-1	The licensee believes that sound characteristics and irregular surface configurations of a mockup similar to their SG channel head configuration diminished UT effectiveness, thus making UT impractical.	Granted in Safety Evaluation dated November 5, 1992
North Anna, Unit 2	second	PZR surge nozzle inside radius	VT-2	The licensee believes that any gains in system integrity resulting from UT over VT-2 cannot be justified because of the increase in radiation exposure of UT personnel performing the examination and the limited maneuverability in the weld areas.	Granted in Safety Evaluation dated November 5, 1992
Surry, Unit 1	third	SG nozzle-to vessel inside radius	VT-1, with color capability	The licensee believes that a mockup of their channel head configuration is needed in order to develop an effective UT procedure, to perform calibrations, and to conduct training.	Granted in Safety Evaluation dated July 19, 1995

Surry, Unit 1	third	PZR surge nozzle inside radius	VT-2	The licensee believes that any gains in system integrity resulting from UT over VT-2 cannot be justified because of the increase in radiation exposure of UT personnel performing the examination and the limited maneuverability in the weld areas. The licensee also believes that a mockup of their configuration is needed in order to develop an effective UT procedure, to perform calibrations, and to conduct training.	Granted in Safety Evaluation dated July 19, 1995
Surry, Unit 2	third	SG nozzle-to vessel inside radius	VT-1, with color capability	The licensee believes that a mockup of their channel head configuration is needed in order to develop an effective UT procedure, to perform calibrations, and to conduct training.	Granted in Safety Evaluation dated August 30, 1995
Surry, Unit 2	third	PZR surge nozzle inside radius	VT-2	The licensee believes that any gains in system integrity resulting from UT over VT-2 cannot be justified because of the increase in radiation exposure of UT personnel performing the examination and the limited maneuverability in the weld areas. The licensee also believes that a mockup of their configuration is needed in order to develop an effective UT procedure, to perform calibrations, and to conduct training.	Granted in Safety Evaluation dated August 30, 1995

PZR = pressurizer, SG = steam generator

\* VT-2 examinations of the PZR and SG nozzle outside surfaces are required by Code