



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

October 9, 2009

Mr. David A. Heacock  
President and Chief Nuclear Officer  
Virginia Electric and Power Company  
Innsbrook Technical Center  
5000 Dominion Boulevard  
Glen Allen, VA 23060-6711

SUBJECT: NORTH ANNA POWER STATION, UNIT NO. 2, THIRD 10-YEAR INSERVICE  
INSPECTION PLAN – SYSTEM PRESSURE TESTING (TAC NO. ME1104)

Dear Mr. Heacock:

By letter dated April 17, 2009, Virginia Electric and Power Company (the licensee) requested relief from certain requirements of Section XI of the American Society of Mechanical Engineers, *Boiler and Pressure Vessel Code* (ASME Code), under the provisions of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a for the third 10-year Inservice Inspection (ISI) Interval for North Anna Power Station, Unit No. 2 (NAPS 2).

The U.S. Nuclear Regulatory Commission (NRC) staff finds that the ASME Code requirements would impose a hardship without a compensating increase in quality and safety. The licensee's proposed alternative provides reasonable assurance for verification of structural integrity of the subject components. Therefore, the NRC staff authorizes the requested Relief Request No. SPT-014 pursuant to 10 CFR 50.55a(a)(3)(ii).

The third 10-year ISI interval program is scheduled to be completed by December 13, 2010.

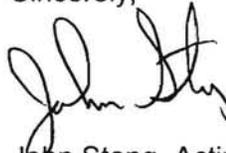
All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including a third-party review by the Authorized Nuclear Inservice Inspector.

D. Heacock

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If you have any questions concerning this matter, please contact Dr. Sreenivas, at (301) 415-2597.

Sincerely,

A handwritten signature in black ink, appearing to read "John Stang". The signature is fluid and cursive, with the first name "John" being more prominent than the last name "Stang".

John Stang, Acting Branch Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-339

Enclosure:  
Safety Evaluation

cc w/encl: Distribution via Listserv



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THIRD 10-YEAR INSERVICE INSPECTION INTERVAL PROGRAM

RELIEF REQUEST NO. SPT-014

NORTH ANNA POWER STATION, UNIT NO. 2

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-339

1.0 INTRODUCTION

By letter dated April 17, 2009, Virginia Electric and Power Company (the licensee), submitted Relief Request No. SPT-014 on system pressure testing for the third 10-Year inservice inspection (ISI) interval applicable to North Anna Power Station, Unit No. 2 (NAPS 2). The relief pertains to a portion of the auxiliary pressurizer spray line not subject to test pressurization during the performance of a system leakage test conducted at or near the end of the inspection interval. In lieu of the Code requirement to pressurize all Class 1 components within the auxiliary pressurizer spray line, the licensee has proposed an alternative to test a portion of the auxiliary pressurizer spray line at an operating pressure associated with 100% reactor power. However, the visual examination during system leakage test would include all components within the auxiliary pressurizer spray system.

The Nuclear Regulatory Commission (NRC) staff has evaluated the licensee's Relief Request No. SPT-014 pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(ii) that compliance to the requirement of the ASME Code would result in hardship without a compensating increase in the level of quality and safety.

2.0 REGULATORY REQUIREMENTS

Section 50.55a(g) requires that ISI of ASME Code Class 1, 2, and 3 components be performed in accordance with Section XI of the ASME Code and applicable addenda, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). According to 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph 50.55a(g) may be used, when authorized by the NRC, if an applicant demonstrates that the proposed alternatives would provide an acceptable level of quality and safety or if the specified requirement 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) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for ISI 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 ISI 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 in paragraph (b) of this section. The ISI Code of Record for the third 10-year ISI interval of North Anna Power Station, Unit 2 is the 1995 Edition with 1996 Addenda of the ASME Code, Section XI.

### 3.0 TECHNICAL EVALUATION

#### System/Component(s) for Which Relief is Requested

All ASME Code Class 1 components in the 2-inch nominal pipe size (NPS) auxiliary pressurizer spray piping system.

#### ASME Code Requirements

Table IWB-2500-1, Examination Category B-P, Item Numbers B15.50 (Piping) and B15.70 (Valves) requires that a system leakage test be performed prior to plant startup following each reactor refueling outage. IWB-5222(b) states that the pressure retaining boundary during the system leakage test conducted at or near the end of each inspection interval shall extend to all Class 1 pressure retaining components within the system boundary.

#### Licensee's Request for Relief

For Class 1 auxiliary pressurizer spray line between isolation valves 2-CH-HCV-2311 and 2-CH-341, a system leakage test shall be conducted at or near the end of each inspection interval prior to reactor startup. The segment of Class 1 piping including the valves in the system boundary will be visually examined for evidence of past leakage and/or leakage during the system leakage test performed at nominal operating pressure associated with 100% reactor power.

#### Licensee's Basis for Requesting Relief

The pressurizer pressure is maintained by normal pressurizer spray which uses the reactor coolant pumps (RCP). Normal pressurizer spray is controlled by the pressurizer pressure control system which automatically controls the pressurizer environment. The primary purpose of the auxiliary spray line is for pressure control when the RCPs are not running (i.e., during a post-accident condition when it is desired to decrease the reactor coolant system (RCS) pressure). Operation of the auxiliary spray line at hot standby or at power would lead to an unnecessary plant transient. In order to meet the Code requirement, the normally closed upstream isolation 2-CH-HCV-2311 must be opened to pressurize the subject piping segment. The charging pumps take suction from the volume control tank and discharge to the pressurizer at a slightly higher pressure than that of the RCS. Therefore, opening of the valve 2-CH-HCV-2311 at hot standby or at power would increase pressurizer spray flow which will cause an adverse reduction in RCS pressure. Further, with the piping segment being at the containment ambient temperature and the RCS at its nominal operating temperature, any injection of cold water into the pressurizer would cause a thermal shock in the spray piping and the spray nozzle.

Also, testing of this piping segment at RCS operating pressure does not provide a compensating increase in the level of quality and safety for the following reasons:

1. The design pressure rating of this piping segment is the same as the RCS; however, the operating pressure of the piping segment is well below the normal RCS operating pressure.
2. This segment is isolated from the RCS pressure under normal operating condition.
3. This segment is subject to ASME Code required VT-2 visual examination. This examination is performed with the segment isolated from the RCS and the RCS at its normal operating pressure and temperature. This examination is performed each refueling outage and is sufficient to identify any structural defect that could potentially challenge the integrity of the segment during normal operation.

#### Staff's Evaluation

The Code of Record, 1995 Edition to the ASME Code, Section XI with 1996 Addenda, Table IWB-2500-1, Category B-P, Item numbers B15.50 and B15.70 requires that a system leakage test of Class 1 pressure retaining piping and valves be performed prior to plant startup following each reactor refueling outage. This leakage test must be performed at a system pressure not less than the pressure corresponding to 100% rated reactor power. Paragraph IWB-5222(b) of the Code on "Boundaries" states:

"The pressure retaining boundary during the system leakage test conducted at or near the end of each inspection interval shall extend to all Class 1 pressure retaining components within the system boundary."

The subject portion of the auxiliary spray piping between isolation valves 2-CH-341 and 2-CH-HCV-2311 corresponds to the reactor coolant pressure boundary and, is required to be pressure tested in accordance with Paragraph IWB-5222(b). However, if auxiliary spray valve 2-CH-HCV-2311 is opened while the RCS is at normal pressure and temperature, cold water would be injected into the pressurizer unnecessarily, causing a drop in RCS pressure. This would cause an off-normal plant transient and create hardship on the licensee.

The subject piping segment at North Anna Unit 2 is 2 inch NPS, Schedule 160, stainless steel pipe between motor control valve 2-CH-HCV-2311 and check valve 2-CH-341 that connects the auxiliary spray line to the normal pressurizer spray line. In the normal operating mode, the pressurizer spray line (downstream of check valve 2-CH-341) is pressurized by the reactor coolant pumps. Piping in the auxiliary spray system (upstream of 2-CH-HCV-2311) is pressurized by the charging pumps. Thus, the line segment between these valves would be pressurized if the auxiliary system is activated, which would only occur when the reactor coolant pumps are not running (i.e., during a post accident condition when it is desired to decrease RCS pressure). Requiring the licensee to activate auxiliary spray for the purpose of a system leakage test with RCS at temperature and pressure would cause a thermal shock transient in the pressurizer spray piping and the spray nozzle.

The licensee has proposed to conduct the system leakage test for this piping segment in accordance with Paragraph IWB-5222(a) of the Code which states:

“The pressure retaining boundary during the system leakage test shall correspond to the reactor coolant boundary, with all valves in the position required for normal reactor operation startup. The visual examination shall, however, extend to and include the second closed valve at the boundary extremity.”

The licensee, however, has proposed an alternative to visually examine (VT-2) for leaks in the isolated portion of the subject segments of piping with the isolation valves in the normal reactor operation startup which would indicate any evidence of past leakage during the operating cycle as well as any active leakage during the system leakage test. The staff has determined that the licensee’s proposed alternative would ensure leakage integrity of the subject piping segment and would meet the intent of the Code requirement.

Further, pressurization of the piping segment in the auxiliary spray line between the isolation valves 2-CH-HCV-2311 and 2-CH-341 to meet the Code requirement on system leakage test, the RCS could be subject to an off-normal transient which may have an adverse impact on RCS components causing hardship to the licensee without a compensating increase in the level of quality and safety.

#### 4.0 CONCLUSION

It is concluded that test pressurization during a system leakage test of the Class 1 pressure retaining components within the system boundary of pressurizer auxiliary spray line in Relief Request No. SPT-014 as required by the Code of Record would result in hardship to the licensee without a compensating increase in the level of quality and safety. The licensee’s proposed alternative in the subject relief request provides a reasonable assurance of structural integrity for the subject piping segments. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), the proposed alternative in Relief Request No. SPT-014 is authorized for the third 10-year ISI interval of North Anna Power Station, Unit No. 2. All other requirements of the ASME Code, Section XI for which relief has not been specifically requested remain applicable, including a third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: P. Patnaik, NRR

Date: October 9, 2009

D. Heacock

- 2 -

If you have any questions concerning this matter, please contact Dr. Sreenivas, at (301) 415-2597.

Sincerely,

*/RA/*

John Stang, Acting Branch Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-339

Enclosure:  
Safety Evaluation

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DATE	10/7/09	10/7/09	09/15/09	10/9/09

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