

May 14, 2001

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 RE: ASME SECTION XI INSERVICE  
INSPECTION INTERVAL (ISI) PROGRAM RELIEF REQUEST (TAC NO.  
MA8915)

Dear Mr. Christian:

This letter grants the relief you requested from the requirements of the American Society of Mechanical Engineers (ASME) Code, Section XI for North Anna Power Station, Unit 1.

By letter dated May 8, 2000, as supplemented February 21, 2001, Virginia Electric and Power Company (VEPCO) requested relief from the examination requirements of the ASME Boiler and Pressure Vessel Code, Section XI, pertaining to reactor vessel shell weld number 4. Interferences located on the exterior and interior of the reactor vessel prevented a complete examination of this weld.

Our evaluation and conclusion is contained in the enclosed Safety Evaluation. VEPCO's proposed alternative examination coverage provides an acceptable level of quality and safety, and reasonable assurance of structural integrity. You are authorized to use your proposed alternative pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g)(6)(ii)(A)(5) and 10 CFR 50.55a(a)(3)(i) for the second ISI interval at North Anna Power Station, Unit 1.

The staff has completed its evaluation of this request; therefore, we are closing TAC No. MA8915.

Sincerely,

**/RA/**

Richard L. Emch, Jr., 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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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF

SECOND 10-YEAR INSERVICE INSPECTION INTERVAL

NORTH ANNA POWER STATION, UNIT 1

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-338

1.0 INTRODUCTION

By letter dated May 8, 2000, as supplemented by letter dated February 21, 2001, Virginia Electric and Power Company (the licensee) submitted a request for relief from certain examination requirements of the American Society of Mechanical Engineers (ASME) Code, Section XI for North Anna Power Station, Unit 1. The information provided by the licensee in support of the request for relief from Code requirements is evaluated herein.

Inservice inspection (ISI) of ASME Code Class 1, 2 and 3 components is to be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel (B&PV) Code and applicable addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the licensee demonstrates that (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 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 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) 12 months prior to the start of each 120-month interval, subject to the limitations and modifications listed therein.

Enclosure

The applicable edition of Section XI of the ASME Code for the second 10-year ISI interval at North Anna Power Station, Unit 1, is the 1983 Edition through the Summer 1983 Addenda.

## 2.0 LICENSEE'S RELIEF REQUEST

### 2.1 Component for which relief is requested:

ASME B&PV Code, Section XI, Subsection IWB, Examination Category B-A, Item B1.10, reactor vessel welds.

<u>Mark/ Weld #</u>	<u>Line #</u>	<u>Drawing #</u>	<u>Class</u>	<u>%Coverage</u>
2	1-RC-R-1	11715-WMKS-RC-R-1	1	100%
3	1-RC-R-1	11715-WMKS-RC-R-1	1	100%
4	1-RC-R-1	11715-WMKS-RC-R-1	1	~80%

### 2.2 Code Requirement:

According to 10 CFR 50.55a(g)(6)(ii)(A), all licensees shall augment their reactor vessel examinations by implementing once, as part of the ISI interval in effect on September 8, 1992, the examination requirements for reactor vessel shell welds specified in Item B1.10 of Examination Category B-A, "Pressure Retaining Welds in Reactor Vessel," in Table IWB-2500-1 of Subsection IWB of the 1989 Edition of the ASME B&PV Code, Section XI, Division 1, subject to certain conditions not applicable to the North Anna Power Station, Unit 1. To meet the requirements of 10 CFR 50.55a(g)(6)(ii)(A), more than 90% of the examination volume of each weld must be examined.

### 2.3 Licensee's Results of Examination:

Welds 2, 3 and 4 were inspected to the extent practical using a remote reactor vessel ultrasonic examination tool. These examinations were performed to satisfy the requirements of the 1983 Edition of ASME Section XI with Addenda through Summer 1983. Also, the requirements of Regulatory Guide 1.150 were followed. The results of the examinations were acceptable according to the flaw indication criteria given in IWB-3510.

The examination volumes for Welds 2 and 3 were 100% of the required coverage. The examination volume for Weld 4 was less than 90% due to interference from four integrally attached core support lugs located on the vessel interior. Table 1 [Table 1 is attached] provides a summary of the limitations associated with the examination of weld 4. Amplifying sketches are also provided in Figures 1 and 2 [Figures 1 and 2 are attached]. Alternative components could not be substituted for examination due to the mandatory selection requirements of the ASME Code and 10 CFR 50.55a(g)(6)(ii)(A).

## 2.4 Licensee's Proposed Alternative:

As shown in Table 1, the Weld 4 examinations covered 80.86% for a beam angle of 45° shear wave, 81.1% for a beam angle of 60° shear wave, and 78.63% for a beam angle of 70° refracted longitudinal wave. However, because the examination volumes of Welds 2 and 3 were each 100%, the total volume examined for all three welds was greater than 93% of the total volume subject to the requirements of 10 CFR 50.55a(g)(6)(ii)(A). The examination of over 93% of the required total volume for the three welds provides reasonable assurance that unacceptable service induced flaws have not developed and that the reactor vessel shell weld integrity is maintained. Also, these examinations provide an acceptable level of quality and safety. Therefore, as an alternative to examining greater than 90% of each weld examination volume as described in 10 CFR 50.55a(g)(6)(ii)(A), it is proposed that the examinations of Welds 2, 3 and 4 be taken as a whole and the total coverage be over 93% of the sum of the required examination volumes for Welds 2, 3 and 4.

The licensee considered supplementing the volumetric examination of weld 4 by performing an examination from the outside surface. The licensee determined the outside examination to be impractical due to congestion in the area below the vessel caused by the flux thimble guide tubes and their associated supports. In addition, the licensee stated that the approximate gap between the neutron shield tank and the reactor vessel in the proximity of weld 4 is only 7½ inches. The licensee stated further that an ultrasonic examination scan from the head side of the weld would be limited as a result of the curvature of the head to shell transition. The licensee determined, therefore, that attaining full coverage of the required examination volume above the weld is not possible due to these accessibility limitations. Therefore, the licensee concluded that there would be no significant increase in examination coverage by performing the volumetric examinations from the outside of the vessel.

## 3.0 EVALUATION

The 1983 Edition, through the Summer 1983 Addenda, of the ASME Code Section XI Table IWB-2500-1, examination category B-A, item number B1.10, Shell Welds, requires examination of all welds in the 1<sup>st</sup> inspection interval and one beltline region weld in successive inspection intervals. However, 10 CFR 50.55a(g)(6)(ii)(A)(2) modified this requirement to require that all licensees augment their reactor pressure vessel examinations by implementing once, as part of the ISI interval in effect on September 8, 1992, the examination requirements for reactor pressure vessel shell welds specified in item B1.10 of examination category B-A, "Pressure Retaining Welds in Reactor Vessel," in Table IWB-2500-1 of Subsection IWB of the 1989 Edition of Section XI, Division 1, of the ASME B&PV Code, subject to the conditions specified in 10 CFR 50.55a(g)(6)(ii)(A)(3) and (4). The licensee is requesting staff authorization of its alternative examination coverage to the requirements of 10 CFR 50.55a(g)(6)(ii)(A)(2), which requires an augmented examination of essentially 100% of the vessel welds.

The licensee indicated that the examination volume for weld 4 is approximately 80% and that they were able to examine essentially 100% of welds 2 and 3. The staff is not accepting the averaging concept of the licensee's proposed alternative that the examinations of welds 2, 3 and 4 when taken as a whole such that the total coverage of the three welds is greater than 93%, is equivalent to meeting the greater than "... 90 percent of the examination volume of

**each** weld ..." requirement of 10 CFR 50.55a(g)(6)(ii)(A)(4). The augmented examination requirements cannot be met for weld 4 due to interference from four integrally attached core support lugs located on the vessel interior. To obtain a 10% increase in coverage of the subject weld, design modifications would be required to allow access from the inside surface (ID).

As a result of the augmented volumetric examination rule, licensees must make a reasonable effort to maximize examination coverage of their reactor vessels. In cases where examination coverage from the ID is inadequate, examination from the outside surface using manual inspection techniques should be considered. However, to manually inspect from the outside surface would result in radiological exposure that is not warranted for the additional 10% volumetric coverage, and other accessibility limitations would be encountered.

The licensee has examined a significant portion of the subject weld (80% of weld 4). Furthermore, the volumetric examination is supplemented with a visual (VT-2) examination of the welds during each refueling outage. In addition, the licensee has met the coverage requirements for the remaining reactor pressure vessel shell welds. Based on the volumetric examination coverage obtained on weld 4, examinations conducted on other reactor pressure vessel welds, and the visual examinations, the staff finds that any significant patterns of degradation, if present, would have been detected and that the examination performed on weld 4 provides an acceptable level of quality and safety.

Therefore, the licensee's obtained examination coverage for weld 4 is authorized pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(5) and 10 CFR 50.55a(a)(3)(i) for the licensee's second ISI interval.

#### 4.0 CONCLUSION

The staff concludes that the licensee's proposed alternative examination coverage for weld 4 provides an acceptable level of quality and safety, and reasonable assurance of structural integrity. Therefore, the licensee is authorized to use its proposed alternative pursuant to 10 CFR 50.55a(g)(6)(ii)(A)(5) and 10 CFR 50.55a(a)(3)(i) for the second ISI interval at North Anna Power Station, Unit 1.

Principal Contributor: A. Keim

Date: May 14, 2001

Attachments: As stated