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

July 27, 2012

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. 1 - RELIEF REQUEST N1-14-NDE-007, TO EXTEND THE FOURTH 10-YEAR FIRST PERIOD FOR THE REACTOR VESSEL INTERIOR VT-3 VISUAL EXAMINATION (B-N-1) (TAC NO. ME8493)

Dear Mr. Heacock:

By letter to the U.S. Nuclear Regulatory Commission (NRC), dated April 26, 2012, Virginia Electric and Power Company (the licensee) submitted a request for authorization to an extension of the inspection period for the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code), Section XI Category B-N-1 inspection requirement to perform a visual VT-3 examination of the reactor vessel interior surfaces, by one refueling cycle beyond the currently scheduled inspection at the North Anna Power Station, Unit No. 1 (NAPS 1). Specifically, in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Section 50.55a(a)(3)(ii), the licensee has proposed alternative N1-14-NDE-007 to extend the 4th inspection interval, period one examination of the reactor vessel interior, Category B-N-1 examination to Fall 2013 refueling outage.

Based on the review of the information the licensee provided, the NRC staff concludes that the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety and the proposed alternative provides a reasonable assurance of structural integrity. Therefore, the licensee's proposed alternative is authorized in accordance with 10 CFR 10 50.55a(a)(3)(ii) for the fourth 10-year Inservice Inspection (ISI) Program activities scheduled to begin Fall 2013 refueling outage.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and authorized herein by the NRC staff remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

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

Sincerely,

Nancy L. Salgado

Nancy L. Salgado, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-338

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv

UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST N1-14-NDE-007, USE OF WELD OVERLAYS AS AN

ALTERNATIVE REPAIR TECHNIQUE FOR STEAM GENERATOR HOT LEG NOZZLES

NORTH ANNA POWER STATION, UNIT NO. 1

VIRGINA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-338

1.0 INTRODUCTION

By letter dated April 26, 2012, (Agencywide Documents Access and Management System (ADAMS), Accession No. ML12128A426), Virginia Electric and Power Company (the licensee), proposed an alternative from certain requirements of the American Society of Mechanical Engineers (ASME), Boiler and Pressure Vessel Code (ASME Code), 2004 Edition, under the provisions of Title 10 of the Code of Federal Regulations (10 CFR), Part 50, Section 50.55a(a)(3)(ii), for the fourth 10-year Inservice Inspection (ISI) Program for North Anna Power Station, Unit No. 1 (NAPS 1).

2.0 REGULATORY REQUIREMENTS

Inservice inspection (ISI) of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Code and applicable addenda as required by Title 10 *Code of Federal Regulations* (10 CFR) 50.55a(g), except where specific relief has been granted by the Nuclear Regulatory Commission (NRC) 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: (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 pre-service 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) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The ASME Code of record for the NAPS, Unit 1 fourth 10-year ISI interval program is the

2004 Edition with no Addenda of Section XI of the ASME Code. The NAPS, Unit No. 1 fourth 10-year ISI interval started on May 1, 2009, and is scheduled to end on April 30, 2019.

3.0 TECHNICAL EVALUATION

RR No. N1-I4-NDE-007

ASME Code Components

Reactor Pressure Vessel (RPV) Interior

ASME Code Requirements

ASME Code, Section XI, Paragraph IWA-2412(a), Inspection Plan B: The required percentage of examination in each Examination Category shall be completed in accordance with Table IWB-2412-1, with the following exceptions:

(1) Examination Categories B-N-1, B-P, and B-Q

ASME Code, Section XI, Table IWB-2500-1. Examination Category B-N-1, Item B13.10 requires a VT-3 visual examination of the spaces above and below the reactor core that are made accessible for examination by removal of components during normal refueling outages each inspection period. ASME Code, Section XI, Table IWA-2500-1 Examination Category B-N-1 further requires with respect to the extent and frequency of examination that this examination will be performed at the first refueling outage and subsequent refueling outages at approximately 3 years intervals (each period) and deferral is not permissible.

Licensee's Basis for Relief Request (as stated)

An alternative is requested from the requirements of [ASME Code, Section XI,] IWB-2412, Inspection Program B, which requires a VT-3 visual examination, of the accessible area of the [RPV] interior made accessible by removal of components during normal refueling outages, to be performed once each inspection period of the interval. Extension of the [ASME Code, Section XI,] Category B-N-1 [RPV] interior examination by one refueling cycle beyond the currently scheduled inspection period is requested.

ASME [Code], Section XI requires that the VT-3 visual examination of the [RPV] interior, [ASME Code, Section XI,] Category B-N-1, be performed once every inspection period. The examination involves inspection of the accessible portion of the [RPV] using either a remote camera on a pole or [submarine (sub)]. These accessible areas consist of the [RPV] flange mating surface and the exposed area of the internals support ledge. Operations personnel involved with the current refueling activities performed video examinations of the [RPV] flange, core support plate and former baffles, and no irregularities were observed in this region of the [RPV.] Subsequent focused reviews of the video by VT-3 qualified personnel in the noted examination areas have also found no evidence of structural degradation or other abnormalities. Additionally, maintenance personnel, including a VT-3 alternate qualified [Quality Control (QC)] inspector performed direct cleaning and inspections of the [RPV] O-ring sealing surfaces and found no evidence of any conditions within the sealing surface areas that would be considered relevant for the inspection criteria associated with our applicable VT procedure. However, these

examinations do not constitute ASME [Code,] Section XI VT-3 [visual] examinations and may not have met the requirements for lighting and resolution verification. Prior to reload of the core during refueling, the lower core plate, the lower core plate forging and vessel bottom, and the top former plate are searched for potential foreign material so that it can be evaluated and removed. Review of the videos provides additional assurance that there is no structural degradation or conditions that could lead to loss of function.

[NAPS, Unit 1] recently completed a reactor refueling and the subject examination was intended to be performed during the current refueling outage but was inadvertently missed. [NAPS, Unit 1] has completed the refueling and is preparing for plant startup. Completing the required [RPV] interior examination would require a second disassembly and reassembly of the [RPV] head and upper internals, resulting in additional radiation [as-low-as-reasonably-achievable (ALARA)] concerns and potential hazards to plant personnel without compensating increase in the level of quality or safety.

Licensee's Proposed Alternative Examination (as stated)

The planned end of the first period of the fourth inspection interval is the final day of the current spring refueling outage, originally expected prior to April 30, 2012. The subject examination was intended to be performed during the current spring 2012 refueling outage. The proposed inspection date is one refueling cycle beyond the Code-allowed inspection period.

1. The procedure for this examination inspects the following:

2. Structural distortion, displacement of parts to the extent component function may be impaired;

3. Loose, missing, cracked or fractured parts, bolting or fasteners;

4. Foreign materials or accumulation of corrosion products that could interfere with control rod motion or could result in blockage of coolant flow through the fuel;

5. Corrosion or erosion that reduces the nominal section thickness by more than 5 [percent];

6. Wear of mating surfaces that may lead to loss of function; or

7. Structural degradation of interior attachments such that the original cross-sectional area is reduced more than 5 [percent].

The [RPV ASME Code, Section XI,] Category B-N-1, Examination Item, B13.10, is required to be performed each inspection period, and it was performed satisfactorily each period during the third 10-year inspection interval that ended April 30, 2009. The examination was last performed during the 10-year ISI vessel examinations during the spring 2009 refueling outage, and included the higher level of detail of the 10-year ISI when the core barrel and lower internals are also removed from the core allowing better access to applicable welds and surfaces. No relevant indications were noted during these examinations. Given that the prior examinations were of sufficient quality to identify any significant flaws that would challenge reactor vessel integrity, the proposed alternative of extending the [ASME Code, Section XI,] Category B-N-1

examination one cycle provides a reasonable assurance of structural integrity. Additionally, review of industry surveys indicate that these examinations have been performed many times throughout the industry without any reportable findings.

Considering that refueling personnel perform observations each refueling to identify similar relevant conditions as required by the subject [ASME Code, Section XI, Examination Category] B-N-1 examination, and no irregularities were observed other than minor foreign material at the lower core plate and vessel bottom, which was not associated with core component damage and were subsequently removed, delaying this examination one additional operating cycle is considered to have no effect on operational readiness and provides a reasonable assurance of structural integrity without the significant additional dose and hardship associated with completing this examination in the current refueling outage. The subject components have a low likelihood of having significant flaws that can be detected visually.

Therefore, in accordance with 10 CFR 50.55a(a)(3)(ii), this extension of the [ASME Code, Section XI,] Category B-N-1 examination is requested on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without compensating increase in the level of quality and safety.

Staff Evaluation

The licensee proposed an alternative to the ASME Code-required VT-3 visual examination of the RPV internal spaces above and below the reactor core that are made accessible for examination by removal of components during normal refueling outages each inspection period. The ASME Code, Section XI, VT-3 visual examination that was scheduled for the spring 2012 refueling outage, was inadvertently missed by the licensee, and the RPV had been reassembled at that point. To require the licensee to perform the ASME Code-required examination would be a hardship because it would require a second disassembly and reassembly of the RPV head and upper internals, resulting in potential hazards to plant personnel, damage to the RPV components, and additional radiation dose to personnel without a compensating increase in the level of quality and safety.

The license has proposed as an alternative to extend the first period of the NAPS, Unit 1 fourth 10-year ISI interval in order to perform the required VT-3 visual examination of the accessible areas of the RPV internal surface in the next refueling outage scheduled for fall, 2013.

The subject examination was last performed by the licensee during the spring 2009 refueling outage, and no relevant indications were noted at that time. Furthermore, this examination was of high quality because the core barrel and lower reactor internals were removed allowing better access to the surfaces required to be examined. In addition the areas of the RPV required to be examined were observed during the spring 2012 refueling outage, by refueling personnel although these observations do not meet the standards for an ASME Code VT-3 examination. The licensee observed no irregularities of the examination area during the current refueling outage other than minor foreign material at the lower core plate and vessel bottom.

During the spring 2012 refueling outage, the licensee's maintenance personnel, including a VT-3 alternate qualified QC inspector performed direct cleaning and inspections of the RPV O-ring sealing surfaces and found no evidence of any conditions within the sealing surface areas that would be considered relevant for the inspection criteria associated with the licensee's

applicable visual examination procedure. In addition, prior to reload of the core during refueling, the lower core plate, the lower core plate forging and vessel bottom, and the top former plate were searched by the licensee for potential foreign material. A review of the videos taken by the licensee during these procedures provides additional assurance that there is no structural degradation or conditions that could lead to loss of function of the RPV components. Furthermore, similar examinations are routinely performed at each operating reactor and the staff is not aware of any industry trends of relevant indications or degradation detected during these examinations that would affect RPV integrity. Therefore, the staff determined that based on the observations by the licensee's personnel during spring 2012 refueling operations and the VT-3 visual examinations performed by the licensee during the spring 2009 refueling outage which revealed no degradation or flaws, combined with industry experience with similar examinations, that the licensee's proposed alternative provides reasonable assurance of structural integrity of the RPV.

4.0 CONCLUSION

The staff has reviewed the licensee's submittal and concludes that to have the licensee shut down the reactor for sole purpose of performing the ASME Code, Section XI, Category B-N-1 VT-3 visual examination would be a hardship without a compensating increase in safety. Furthermore, the staff concludes that the licensee's proposed alternative provides reasonable assurance of structural integrity and leak tightness of the RPV.

Therefore, the NRC staff hereby authorizes Dominion's request for alternative in accordance with 10 CFR 50.55a(a)(3)(ii) to extend the NAPS, Unit 1 Period 1 of the Fourth 10-year Inspection Interval, for examination of the RPV internal surface by one refueling cycle beyond the spring 2012 refueling cycle. Therefore, the ASME Code-Section XI, Category B-N-1, Item B13.10 required VT-3 visual examination of the RPV internal surface for the fourth 10-year ISI interval first inspection period must be performed during the fall 2013 refueling outage.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in the subject requests for relief remain applicable, including third-party review by the authorized Nuclear Inservice Inspector.

Principal Contributor: Thomas McLellan, NRR

Date: July 27, 2012

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

Sincerely,

/RA/

Nancy L. Salgado, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-338

Enclosure:
Safety Evaluation

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ADAMS Accession No. ML12207A062 * E-mail memo transmitted SE dated 06/27/12

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