April 25, 2000

Mr. J. P. O'Hanlon
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 PROGRAM THIRD 10-YEAR INTERVAL REQUESTS FOR RELIEF (TAC NO. MA5750)

Dear Mr. O'Hanlon:

The purpose of this letter is to disposition the 23 requests for relief you submitted for North Anna Power Station, Unit 1, related to your Inservice Inspection (ISI) Program Third 10-Year Interval. Of the 23 requests, 16 have been granted, 5 were determined to no longer be needed because we revised certain Regulatory Guides subsequent to your submittal, one was treated as withdrawn per your instructions in your submittal, and one (NDE-9) has been revised and resubmitted by VEPCO on April 6, 2000, and remains under review.

In your letters dated April 8 and August 20, 1999, and January 21, 2000, you submitted 23 requests for relief from ASME CODE, Section XI requirements for the third 10-year ISI interval for North Anna Unit 1. These included: NDE requests 1 through 14, SPT requests 1 through 8, and request CS-1. We have reviewed the requests and reached the following conclusions: (a) NDE-1 through 8, NDE-12 through 14, SPT-1, 4,5, and 8, and CS-1 have been approved; (b) NDE-10 and 11, and SPT 2, 3, and 7 are no longer necessary because we revised certain Regulatory Guides subsequent to your request; (c) SPT-6 has been treated as withdrawn per your instructions; and (d) NDE-9 remains under review. NDE-9 was revised by VEPCO and resubmitted April 6, 2000, along with a new relief request, NDE-15. NDE-9 and NDE-15 are being reviewed under TAC No. MA8567.

Our evaluation of each relief request is enclosed, including the regulatory basis for approval/disapproval.

The staff has completed its evaluation of this matter; therefore, we are closing TAC No. MA5750.

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: North Anna Safety Evaluation

cc w/encl: See next page

The staff has completed its evaluation of this matter; therefore, we are closing TAC No. MA5750.

Sincerely,

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Enclosure: North Anna Safety Evaluation

cc w/encl: See next page

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Mr. J. P. O'Hanlon
Virginia Electric and Power Company

North Anna Power Station
Units 1 and 2

cc:
Mr. J. Jeffrey Lunsford
County Administrator
Louisa County
P.O. Box 160
Louisa, Virginia 23093

Mr. W. R. Matthews
Site Vice President
North Anna Power Station
P.O. Box 402
Mineral, Virginia 23117

Mr. Donald P. Irwin, Esquire
Hunton and Williams
Riverfront Plaza, East Tower
951 E. Byrd Street
Richmond, Virginia 23219

Mr. E. S. Grecheck
Site Vice President
Surry Power Station
Virginia Electric and Power Company
5570 Hog Island Road
Surry, Virginia 23883

Dr. W. T. Lough
Virginia State Corporation
Commission
Division of Energy Regulation
P.O. Box 1197
Richmond, Virginia 23209

Robert B. Strobe, M.D., M.P.H.
State Health Commissioner
Office of the Commissioner
Virginia Department of Health
P. O. Box 2448
Richmond, Virginia 23218

Old Dominion Electric Cooperative
4201 Dominion Blvd.
Glen Allen, Virginia 23060

Mr. J. H. McCarthy, Manager
Nuclear Licensing & Operations Support
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Blvd.
Glen Allen, Virginia 23060

Office of the Attorney General
Commonwealth of Virginia
900 East Main Street
Richmond, Virginia 23219

Senior Resident Inspector
North Anna Power Station
U.S. Nuclear Regulatory Commission
1024 Haley Drive
Mineral, Virginia 23117

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REGARDING REQUESTS FOR RELIEF

FOR THE THIRD 10-YEAR INTERVAL INSERVICE INSPECTION

NORTH ANNA NUCLEAR STATION, UNIT 1

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-338

1.0 INTRODUCTION

Inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components shall 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 in part 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) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein and subject to Commission approval.

Pursuant to 10 CFR 50.55a(g)(5)(iii), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is impractical for its facility, information shall be submitted to the Commission in support of that determination and a request made for relief from the ASME Code requirement. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose requirements that are determined to be authorized by law, will not endanger life, property, or the common defense and security, and are otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed. The

applicable edition of the Code for the North Anna Nuclear Station Unit 1 (NAPS-1), third 10-year ISI interval, which began May 1, 1999, is the 1989 Edition of the ASME Code, Section XI.

By letters dated April 8 and August 20, 1999, and January 21, 2000, Virginia Electric and Power Company (VEPCO, the licensee) submitted Relief Requests NDE-1 through 14, SPT-1 through 5, 7 and 8, and CS-1, seeking relief from certain requirements of the ASME Code, Section XI, regarding the examination of component and component support welds. The requests for relief were made pursuant to 10 CFR 50.55(g)(5)(iii) for the third 10-year ISI interval. The staff's evaluation of these requests for relief is as follows:

2.0 EVALUATION

The information provided by the licensee in support of the Requests for Relief NDE-1 through 14, and SPT-1 through 5, 7, and 8, and CS-1 has been evaluated, and the bases for disposition are documented below.

2.1 Request for Relief NDE-1, Examination Category C-G, Item C6.10, Pertaining to Casing Welds in Two Outside Recirculation Spray Pumps

2.1.1 Code Requirement

The 1989 Edition of the ASME Code, Section XI, Table IWC-2500-1, Examination Category C-G (Pump casing welds), Item C6.10, requires surface examination of 100 percent of welds for each 10-year ISI interval in all pump casings as defined by Figure IWC-2500-8. The examination can be limited to one pump in the case of multiple pumps of similar design, size, function, and service in a system. The examination may be performed from either the inside or outside surface of the component.

2.1.2 Licensee's Code Relief Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100-percent surface examination coverage of pump casing welds listed below for Outside Recirculation Spray Pumps:

Pump	Drawing No.	Weld No.
1-RS-P-2A	11715-WMKS-RS-P-2A	SW-1, SW-2, SW-3, LS-6, LS-7, LS-8, LS-9, and LS-10
1-RS-P-2B	11715-WMKS-RS-P-2B	SW-1, SW-2, SW-3, LS-6, LS-7, LS-8, LS-9, and LS-10

The licensee requested that relief be granted for the inservice examination to be performed during the third 10-year ISI interval.

2.1.3 Licensee's Basis for Relief Request (as stated):

"Each of the two outside recirculation spray pump casings have a total of five circumferential welds and five longitudinal welds. Three of the circumferential welds (SW-1, SW-2, and SW-3),

and three of the longitudinal welds (LS-6, LS-7 and LS-8) are completely encased in concrete and are not accessible for examination from the outside diameter (O.D.). Of the remaining two longitudinal welds, one weld is partially encased in concrete (LS-9) and one weld is partially covered by a vibration plate (LS-10). Partial O.D. examinations can be performed on both of these longitudinal welds. Two circumferential welds are completely accessible for examinations from the O.D. Surface examinations from the Inside Diameter (I.D.) are not a practicable alternative. Access to the inside of the pump casings is limited by physical size (24 inch outside diameter), the pump shaft, and the pump shaft support obstructions. Disassembly of the pump and removal of the pump shaft would cause a burden without a compensating increase in quality and safety."

2.1.4 Licensee's Proposed Alternative Examination (as stated):

"A surface examination of the accessible portions of the circumferential and longitudinal welds will be performed to the extent and frequency described in Table IWC-2500-1. A remote visual examination (VT-1) of the I.D. of the pump casing welds will be performed only if the pump is disassembled for maintenance, and the pump shaft is removed."

2.1.5 Staff Evaluation:

The NRC staff has reviewed the licensee's information concerning the ISI Program Request for Relief NDE-1 for the third 10-year ISI interval at NAPS-1 pertaining to the pump casing welds for two outside recirculation spray pumps. The Code requires that these welds be given a 100-percent surface examination during each inspection interval. As reported by the licensee, 8 of 10 welds are either completely encased in concrete or partially inaccessible. The inaccessibility of the welds, therefore, makes the surface examination impractical to perform to the extent required by the Code. For complete examination coverage from the outside surface of the welds, redesign and modification of plant layout for relocation of these two pumps would be necessary.

The licensee's proposed alternative is to perform the required surface examination of the accessible portions of the outside surface of accessible pump casing welds to the extent and frequency in Table IWC-2500-1, and to perform a remote visual examination of the interior surface of the pump casing welds when the pumps are disassembled for maintenance and their shafts are removed. The staff finds that the Code requirement for the 100-percent examination of the outside weld surfaces is impractical. Also, the disassembly and removal of pump internals only to perform an examination of the inside weld surfaces is impractical due to the difficulty of performing such extensive maintenance on a large number of pumps every interval. It is likely that such maintenance would negatively contribute to the operation of the pumps. Should the pump be disassembled for maintenance, the use of a remote VT-1 visual examination will provide an acceptable alternative to the required examination techniques in Table IWC-2500-1, considering the accessibility and configuration of the internal weld surfaces. The licensee's proposal is practical given the extent of accessibility for examination and will provide reasonable assurance that inservice flaws, if developed in the pump casing welds, will be detected and removed or repaired prior to the return of the pumps to service. Also, these types of pumps have not experienced any history of degradation affecting pressure boundary integrity. Therefore, Request for Relief NDE-1 is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the third 10-year ISI interval at NAPS-1.

2.2 Request for Relief NDE-2, Examination Category C-G, Item C6.10, Pertaining to Casing Welds in Two Safety Injection Pumps

2.2.1 Code Requirement:

The 1989 Edition of the ASME Code, Section XI, Table IWC-2500-1, Examination Category C-G (Pump Casing Welds), Item C6.10, requires surface examination of 100 percent of welds for each 10-year ISI interval in all pump casings as defined by Figure IWC-2500-8. The examination can be limited to one pump in the case of multiple pumps of similar design, size, function, and service in a system. The examination may be performed from either the inside or outside surface of the component.

2.2.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100-percent surface examination coverage of pump casing welds listed below for Safety Injection Pumps:

Pump	Drawing No.	Weld No.
1-SI-P-1A	11715-WMKS-SI-P-1A	1, 2, 3, LS-1, LS-2, LS-3, LS-4, and LS-5
1-RS-P-1B	11715-WMKS-SI-P-1B	1, 2, 3, LS-1, LS-2, LS-3, LS-4, and LS-5

The licensee requested that relief be granted for the inservice examination to be performed during the third 10-year ISI interval.

2.2.3 Licensee's Basis for Relief Request (as stated):

"Each of the two safety injection pump casings has a total of five circumferential welds and five longitudinal welds. Three of the circumferential welds (1, 2, and 3), and three of the longitudinal welds (LS-1, LS-2 and LS-3) are completely encased in concrete and are not accessible for examination from the outside diameter (O.D.). Of the remaining two longitudinal welds, one weld is partially encased in concrete (LS-4) and one weld is partially covered by a vibration plate (LS-5). Partial O.D. examinations can be performed on both these longitudinal welds. Two circumferential welds are completely accessible for examinations from the O.D. Surface examinations from the Inside Diameter (I.D.) are not a practical alternative. Access to the inside of the pump casings is limited by physical size (24 inch outside diameter), the pump shaft, and the pump shaft support obstructions. Disassembly of the pump and removal of the shaft would cause a burden without a compensating increase in quality and safety."

2.2.4 Licensee's Proposed Alternative Examination (as stated):

"A surface examination of the accessible portions of the circumferential and longitudinal welds will be performed to the extent and frequency described in Table IWC-2500-1. A remote visual examination (VT-1) of the I.D. of the pump casing welds will be performed only if the pump is disassembled for maintenance, and the pump shaft is removed."

2.2.5 Staff Evaluation:

The NRC staff has reviewed the information concerning the ISI Program Request for Relief NDE-2 in the licensee's letters dated April 8, and August 20, 1999, for the two safety injection pump casing welds. The Code requires that the subject welds be 100-percent surface examined during each inspection interval. As stated by the licensee, 8 of the 10 subject welds are either completely encased in concrete or partially inaccessible. The inaccessibility of the welds, therefore, makes the surface examination impractical to perform to the extent required by the Code. For complete examination coverage, redesign and modification of plant layout for relocation of these two pumps would be necessary.

The licensee requested relief to perform the Code-required surface examination of the accessible outside surface of the pump casing welds to the maximum extent practical, and to perform a remote visual examination of the interior surface of the pump casing welds when the pumps are disassembled for maintenance and their shafts are removed. The staff finds that the Code requirement for the 100-percent examination of the outside weld surfaces is impractical. Also, the disassembly and removal of pump internals only to perform an examination of the inside weld surfaces is impractical due to the difficulty of performing such extensive maintenance on a large number of pumps every interval. It is likely that such maintenance would negatively contribute to the operation of the pumps. Should the pump be disassembled for maintenance, the use of a VT-1 visual examination will provide an acceptable alternative to the required examination techniques in Table IWC-2500-1, considering the accessibility and configuration of the internal weld surfaces. The licensee's proposal is practical given the extent of accessibility for examination and will provide reasonable assurance that inservice flaws, if developed in the pump casing welds, will be detected and removed or repaired prior to the return of the pumps to service. Also, these types of pumps have not experienced any history of degradation affecting pressure boundary integrity. Therefore, Request for Relief NDE-2 is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the third 10-year ISI interval at NAPS-1.

2.3 Request for Relief NDE-3, Pertaining to Ultrasonic Calibration Blocks

2.3.1 Code Requirement:

The 1989 Edition of the ASME Code, Section XI, Appendix I, as supplemented by Table I-2000-1, requires that ultrasonic calibration blocks meet ASME Code, Section V for vessels with thickness greater than 2", or meet ASME Code, Section XI, Appendix III for piping and vessels with thickness less than 2".

2.3.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the following: (1) the Code-recommended design configuration of calibration blocks, as shown in ASME Code, Section XI, Figure III-3230-2, for piping and vessels less than 2" in thickness; (2) the notches in some of the piping calibration blocks meeting the Code-recommended 1½" from the end of the block, as specified in ASME Code, Section XI, Figure III-3230-1; and (3) the vessel calibration blocks, used for the reactor vessel head-to-flange weld, steam generator primary side tubesheet-to-head weld, and pressurizer welds, being fully clad as shown in Figure T-441.1 of ASME Code, Section V, Article 4. The licensee requested that relief be granted for the inservice examination to be performed during the third 10-year ISI interval.

2.3.3 Licensee's Basis for Relief Request (as stated):

"North Anna Power Station was constructed prior to the issuance and adoption of ASME Section XI. Therefore, ultrasonic calibration blocks were fabricated before the guidelines of ASME Section XI were developed and approved.

"The blocks for piping and vessels $\leq$ 2" do not meet the recommended design specified by Figure III-3230-2 for thicknesses <1" in that the notches are not staggered. Also, the notches in some of the piping blocks are located one (1) "t" from the end of the block instead of 1½" as specified by Figure III-3230-1. The vessel calibration blocks used for the reactor vessel head-to-flange weld, steam generator primary side tubesheet-to -head weld, and pressurizer welds are partially clad instead of fully clad as shown by Figure T-441.1 of ASME Section V, Article 4.

"Meeting the requirements of the 1989 Code would require us to manufacture new calibration blocks. The fabrication of new ultrasonic calibration blocks would cause a burden without a compensating increase in quality and safety. Satisfactory ultrasonic system calibration can be performed with the existing calibration blocks. Use of the existing calibration blocks also allows correlation of ultrasonic data from previous interval examinations as required by IWA-1400(h). The location of the notches in the piping calibration blocks provides adequate signal separation for sweep calibration. Distance-amplitude calibration down to the clad-to-base metal interface, as delineated by Nonmandatory Appendix B to Section V, Article 4, can be performed from the unclad portion of the clad side of the existing vessel calibration blocks."

2.3.4 Licensee's Proposed Alternative Examination (as stated):

"The existing ultrasonic calibration blocks will be used for the third inspection interval examinations in lieu of current code requirements. In addition, Code Case N-461, Alternative Rules for Piping Calibration Block Thickness, will be used as necessary."

2.3.5 Staff Evaluation:

The NRC staff has reviewed the information concerning the ISI Program Request for Relief NDE-3 for the third 10-year ISI interval of NAPS-1 pertaining to ultrasonic calibration blocks. The 1989 Edition of the ASME Code requires that the configuration of ultrasonic calibration blocks meet conditions specified by the Code. However, the existing ultrasonic calibration blocks at NAPS-1 were fabricated before the guidelines of ASME Section XI were

developed and approved. To fully comply with the Code-specified configuration requirements, manufacture of new calibration blocks would be necessary.

The licensee also proposed in its request for relief to use the alternative requirements in Code Case N-461 for the calibration block thickness that are within 25 percent of the pipe wall thickness to be examined. The NRC has previously found this Code Case acceptable, subject to the Conditions in the Code Case and the additional condition regarding examiner knowledge of thickness and joint contour stated in Regulatory Guide 1.147, Revision 12, dated May 1999. As explained in the request, examination results of the first and second ISI intervals have shown that satisfactory ultrasonic system calibration can be performed with the existing calibration blocks, and use of the existing calibration blocks also allows correlation of ultrasonic data from previous interval examinations.

Based on the information provided in this request for relief, the staff has determined that the use of the current calibration blocks provides reasonable assurance of acceptable examinations, and the fabrication of new blocks, if imposed, would be an undue burden on the licensee without a compensating increase in the level of quality and safety. Thus, the alternative use of the current calibration blocks is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the third ISI interval at NAPS-1. Use of Code Case N-461, "Alternate Rules for Piping Calibration Block Thickness," is approved as provided in Regulatory Guide 1.147, Revision 12, with the conditions specified therein.

2.4 Request for Relief NDE-4, Pertaining to Class 1 and 2 Piping, Vessel, and Component Welds

2.4.1 Code Requirement:

The 1989 Edition of the ASME Code, Section XI, requires that a reference system as delineated in IWA-2600 shall be established for all welds subject to surface or volumetric examination. The system shall permit identification and location of each weld.

2.4.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from establishing a new reference system that would be totally in compliance with guidelines delineated in IWA-2600 of the 1989 Edition of the ASME Code, Section XI, for Class 1 and 2 piping, vessel, and component welds. The licensee requested that relief be granted for the inservice examination to be performed during the third 10-year ISI interval.

2.4.3 Licensee's Basis for Relief Request (as stated):

"The original construction code used at North Anna Power Station, ANSI B31-7, 1969 Edition, did not establish a weld reference system. Immediate establishment of a weld reference system cannot be practically attained within the scope and schedule of existing outages.

"North Anna Unit 1 updated its weld isometrics during interval two. These isometrics provide a detailed identification of weld location. Additionally, welds examined during the second interval were marked to indicate a zero point and direction of examination per second interval Relief Request NDE-13. Second interval Relief Request NDE-13 was approved by NRC Letter

No. 92-255, dated 4/7/92, with the condition that each Class 1 and 2 piping weld examined receives all of the required reference markings as the inservice examination are performed."

2.4.4 Licensee's Proposed Alternative Examination (as stated):

"It is our intention to continue to use the markings made in the second interval, and to continue to mark welds in the third interval in an identical manner. Welds which contain recordable indications shall be appropriately marked to ensure future location of the indication. The reference system and marks will be permanently fixed on the weld."

2.4.5 Staff Evaluation:

The NRC staff has reviewed the information concerning the ISI Program Request for Relief NDE-4 for the third 10-year ISI interval of NAPS-1 pertaining to Class 1 and 2 piping, vessel, and component welds. The licensee proposed to continue to use the existing markings made in the second ISI interval in its updated weld isometrics, and the existing markings and weld isometrics had been reviewed and approved by the NRC. As further explained in the request, these isometrics provide a detailed identification of weld location, zero point and direction of examination. Therefore, the markings and isometrics provide recordable indications for future examinations and serve the purpose and intent of IWA-2600 of the 1989 Code, although not totally in conformance with the Code in details for a weld reference system. In addition, continued use of the existing markings and isometrics will allow consistent comparison of future examination results with the previous examination results. Based on the information provided in this request for relief, the staff has determined that it would be a considerable hardship for the licensee to meet the conditions to the extent required by the Code. To completely meet the scope of 1989 Code-specified requirements for a weld reference system, changes in schedule and extentions in duration of the next plant refueling outage would be necessary. Imposition of this requirement would cause a considerable hardship on the licensee without a compensating increase in the level of quality and safety. The licensee's proposed alternative reference approach provides reasonable assurance of acceptable examinations. Therefore, the alternative in Request for Relief NDE-4 is authorized pursuant to 10 CFR 50.55a(a)(3(ii) for the third ISI interval at NAPS-1.

2.5 Request for Relief NDE-5, Pertaining to Pressure-Retaining Welds in the Reactor Vessel and Vessel Nozzle Area Examined by the Automated Vessel Tool Inspection Device

2.5.1 Code Requirement:

The 1989 Edition of the ASME Code, Section XI, requires that a reference system as delineated in IWA-2600 shall be established for vessel welds subject to surface or volumetric examination. The system shall permit identification, location, and placing reference points on the center line of each weld to ensure repeatability of examination.

2.5.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from establishing a new reference system that would be totally in compliance with guidelines delineated in IWA-2600 of the 1989 Edition of the ASME Code, Section XI, for welds in the reactor vessel and vessel

nozzle area. The licensee requested that relief be granted for the inservice examination to be performed during the third 10-year ISI interval.

2.5.3 Licensee's Basis for Relief Request (as stated):

"The automated tool establishes its reference point using an existing zero reference in the reactor vessel. This point allows the device to repeat examination locations without the necessity of any other reference systems. It accomplishes this by the use of an electronic encoder system, which provides for sufficient repeatability."

2.5.4 Licensee's Proposed Alternative Examination (as stated):

"The automated vessel tool examinations will continue to establish its reference system based upon the existing zero reference. No other system is planned or deemed necessary."

2.5.5 Staff Evaluation:

The NRC staff has reviewed the information concerning the ISI Program Request for Relief NDE-5 for the third 10-year ISI interval of NAPS-1 pertaining to welds in the reactor vessel and vessel nozzle area. The 1989 Edition of the ASME Code requires that a reference system as delineated in IWA-2600 be established for vessel welds subject to examination to permit identification, location, and placing reference points on the center line of each weld, such that repeatability of examination can be ensured. However, guidelines of such a reference system did not exist during the early period after construction of the reactor vessel in NAPS-1, and as a result, NAPS-1 did not establish a reference system for the reactor vessel welds as now required by the 1989 Edition of the ASME Code.

The licensee proposed in its request for relief to continue to use the automated vessel tool examinations for establishing its reference system based upon the existing zero reference in the reactor vessel, and no other reference system is planned. As explained in the request, such an alternative will locate welds with sufficient repeatability for future examinations and serve the purpose and intent of IWA-2600 of the 1989 Code, although not totally in conformance with the Code in details for a weld reference system. In addition, the alternative will provide consistent comparison of future examination results with the previous examination results. Therefore, the staff finds that the licensee's proposed alternative will provide an acceptable level of quality and safety. Therefore, the alternative in Request for Relief NDE-5 is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the third ISI interval at NAPS-1.

2.6 Request for Relief NDE-6, Examination Category B-D, Items B3.110 and B3.120, Pertaining to Nozzle-to-Vessel Welds and Nozzle Inside Radius Section

2.6.1 Code Requirement

The 1989 Edition of the ASME Code, Section XI, Table IWB-2500-1, Examination Category B-D (full penetration welded nozzles in vessels), Items B3.110 and B3.120, require 100-percent volumetric examination for each 10-year ISI interval in all nozzle-to-vessel welds and in the nozzle inside radius section as defined by Figure IWB-2500-7.

2.6.2 Licensee's Code Relief Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required volumetric examination of pressurizer (1-RC-E-2) nozzle-to-vessel weld 9 and nozzle inner radius section 9NIR. These welds are shown on drawing 11715-WMKS-RC-E-2. The licensee requested that relief be granted for the inservice examination to be performed during the third 10-year ISI interval.

2.6.3 Licensee's Basis for Relief Request (as stated):

"The North Anna Unit 1 pressurizer surge line nozzle is surrounded by 78 heater penetrations. Engineering recommends that the heater cables be disconnected prior to the removal of insulation. This recommendation is due to the possibility of damage to the heater element connections if the insulation is removed while the cables are connected. Most of the heater connections are soldered in place. Removal of these connections requires removal of the brazing using a jewelers torch.

"Based upon a previous survey of the applicable area, the dose rate is 150MR [milliRems] [per hour] to 800MR [per hour] in the general area and 300 to 2000 MR [per hour] contact. Based upon estimates provided by site Electrical Maintenance, Insulation Removal, and ISI/NDE, it would require six man hours to disconnect and reconnect the heater cables, four man hours to remove and reinstall the reflective insulation and seven man hours to prepare and examine the nozzle-to-vessel weld and nozzle inside radius section. The resulting dose estimate for these examinations is 8.5 man-Rem.

"Shielding is considered impractical because the shielding material would preclude accessibility to the examination surface.

"Based upon a review of the fabrication drawings, the estimated percentage of the required volume that could be examined on the pressurizer surge line nozzle-to-vessel weld 9 is as follows:

EXAMINATION ANGLE EXAMINED	PERCENTAGE
45 Degrees	60%
60 Degrees	40%
0 Degrees	80%

"The examination coverage of the nozzle inside radius section 9NIR would be somewhat larger, however we feel that the confined access to the nozzle as a result of the pressurizer skirt, surge line piping and heater penetrations, and area dose rates would result in only a "best effort" examination in either case.

"To attempt to perform the examination, which would be a "limited best effort" would cause a burden without a compensating increase in quality and safety.

"A similar relief was granted for use during interval two by NRC letter No. 92-255, dated 04/07/92."

2.6.4 Licensee's Proposed Alternative Examination (as stated):

"A visual (VT-2) examination of the pressurizer surge line nozzle-to-vessel weld will be performed during the normally scheduled system leakage test each refueling. In addition:

1. Technical Specifications require that the Reactor Coolant System Leak Rate be limited to one gallon per minute unidentified leakage. This value is calculated at least once per 72 hours; and
2. The containment atmosphere particulate radioactivity is checked every 12 hours."

2.6.5 Staff Evaluation:

The NRC staff has reviewed the information concerning the ISI Program Request for Relief NDE-6 for the third 10-year ISI interval of NAPS-1 pertaining to nozzle-to-vessel welds and nozzle inside radius section. The Code requires a 100-percent volumetric examination of all nozzle-to-vessel welds and of the nozzle inside radius section during each inspection interval. As stated by the licensee, the pressurizer lower head design incorporates penetrations for heaters. The location of these heater penetrations and the lower head design limit the accessibility for performing a 100-percent volumetric examination of the surge line nozzle-to-vessel weld and the associated inside radius section. The licensee has estimated the percentage of the required volume that could be examined. However, even the limited examination, which would be a "limited best effort" as stated by the licensee, is not commensurate with the personnel exposure that would be received. The inaccessibility of the welds, therefore, makes the volumetric examination impractical to perform to the extent required by the Code. Supporting the impracticality of conducting the complete inspection on the accessible portion are the ALARA considerations.

The licensee proposed an alternative in its request for relief to perform visual (VT-2) examination of the pressurizer surge line nozzle-to-vessel weld during the normally scheduled system leakage test in each refueling. In addition, per Technical Specification requirements, reactor coolant leakage is monitored through periodic surveillance using a water inventory calculation and a containment atmosphere particulate radioactivity check. The proposed alternative will provide reasonable assurance that unallowable reactor coolant leakage, if it occurred in surge line welds, would be detected early. Therefore, considering the impracticality of performing the full examinations and the burden from potential radiation exposure, Request for Relief NDE-6 is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the third 10-year ISI interval at NAPS-1, subject to the performance of the visual examination of the surge line nozzle-to-vessel weld.

2.7 Request for Relief NDE-7, Examination Categories B-B, B-D, B-K, and C-A, Items B2.80, B2.51, B3.150, B3.160, B10.10, C1.20, and C1.30, Pertaining to Regenerative Heat Exchanger Vessel and Nozzle Circumferential Welds

2.7.1 Code Requirement

The 1989 Edition of the ASME Code, Section XI, Tables IWB-2500-1 and IWC-2500-1, Examination Categories B-B, B-D, and C-A, Items B2.80, B2.51, B3.150, B3.160, C1.20, and C1.30, pertaining to regenerative heat exchanger (RHX) full penetration welds in vessel head, nozzle connection, tubesheet-to-vessel shell, and nozzle inside radius area, as shown by Figures IWB-2500-1,-3,-6,-7, and IWC-2500-1,-2, require 100-percent volumetric examination for each 10-year ISI interval. For integral vessel attachment welds under Category B-K, Item B10.10, as shown by Figures IWB-2500-13,-14,-15, surface or volumetric examination of a representative sample of similar design is required.

2.7.2 Licensee's Code Relief Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100-percent volumetric examination of welds in vessel head, nozzle connection, tubesheet-to-vessel shell, welded attachments to vessels, and nozzle inside radius area in RHX (1-CH-E-3) of the chemical and volume control system. These welds are listed below:

Weld/Component Class	Description	Code	Item #
3	tubesheet-to-shell	B2.80	1
7	tubesheet-to-shell	B2.80	1
11	tubesheet-to-shell	B2.80	1
4	circumferential head	B2.51	1
8	circumferential head	B2.51	1
12	circumferential head	B2.51	1
13	nozzle-to-vessel	B3.150	1
14	nozzle-to-vessel	B3.150	1
15	nozzle-to-vessel	B3.150	1
16	nozzle-to-vessel	B3.150	1
17	nozzle-to-vessel	B3.150	1
18	nozzle-to-vessel	B3.150	1
13-NIR	nozzle inside radius	B3.160	1
14-NIR	nozzle inside radius	B3.160	1
15-NIR	nozzle inside radius	B3.160	1
16-NIR	nozzle inside radius	B3.160	1
17-NIR	nozzle inside radius	B3.160	1
18-NIR	nozzle inside radius	B3.160	1
WS-1	welded attachment	B10.10	1
WS-2	welded attachment	B10.10	1
WS-3	welded attachment	B10.10	1
1	circumferential head	C1.20	2
5	circumferential head	C1.20	2
9	circumferential head	C1.20	2

2	tubesheet-to-shell	C1.30	2
6	tubesheet-to-shell	C1.30	2
10	tubesheet-to-shell	C1.30	2

The licensee requested that relief be granted for the inservice examination to be performed during the third 10-year ISI interval.

2.7.3 Licensee's Basis for Relief Request (as stated):

"The regenerative heat exchanger (I-CH-E-3) provides preheat for the normal charging water going into the reactor coolant system (RCS). The preheat is derived from normal letdown water coming from the RCS. Charging and letdown constitute the normal chemical and volume control within the RCS. The heat exchanger itself is actually three heat exchangers in series, interconnected with piping. This fact was previously utilized in limiting examinations to one of the heat exchangers as allowed by the Code. The heat exchanger has an outside shell diameter of 9.55 inches. The shells were manufactured with ASTM A351 CF8 type material. The heads were manufactured with ASTM A240 TP304 material. The 3 inch nozzle necks were manufactured with ASTM A182 F304 material. In the past the regenerative heat exchanger was entirely classified ASME Class 2 for inservice inspection activities. However, a reanalysis changed the classification of the letdown side of the heat exchanger to ASME Class 1. This action significantly increases the examination requirements associated with this heat exchanger. Nozzles, which were previously exempt under Class 2 requirements, are now required to be examined. Additionally, all Class 1 nozzles are required to be examined, and the examinations are not limited to one heat exchanger.

"The nozzle-to-vessel welds and nozzle inside radius sections for this vessel were not designed for ultrasonic examination from the outside diameter of the vessel. The small diameter of the vessel and nozzles along with the cast stainless steel vessel shell prevents a meaningful ultrasonic examination of these components.

"The Code required volumetric examination on the vessel head circumferential welds is limited due to the weld crown, radius of the closure caps, and the nozzles. The Code required volumetric examination of the tubesheet welds is limited by the weld crown and is obstructed by a support clamp. This clamp must be mechanically removed prior to the welds' examination. Additionally weld 11 is partially obscured by the six integral attachments, which are themselves butted up against a clamp. It is estimated that between 21 and 42 percent of the circumferential welds could be examined, and 42 percent of the tubesheet welds could be examined, if the clamps are removed. Weld 11 would be significantly less due to the integral attachment location. Previous partial examinations completed on these welds have identified no problems.

"An ALARA evaluation has been conducted on each activity associated with these examinations. A table is provided documenting these results. It is estimated that more than 14 man-rem will be required to complete these examinations over the interval. This estimate assumes optimum inspection and preparation times. If difficulties are encountered, a corresponding increase in dose would be expected. Shielding is not considered practical since the source of radiation is the component receiving the examinations. Considering the examination limitations previously discussed, expending this much dose is deemed impractical.

"This relief request was originally submitted for the second interval by letter Serial No. 93-018, dated February 16, 1993. The relief was granted with conditions by NRC Letter No. 96-525 Dated 10/01/96 and its associated safety evaluation report."

The licensee's ManRem estimate for conducting Code-required examination on the RHX (1-CH-E-3) follows:

Work Task	Man-Hours (hrs)	Dose Rate (Rems(R)/hr)	Man-Rem
Insulation Remove/Install	5.3	0.500	2.650
Scaffolding Install/Remove	2.0	0.300	0.600
Clamp Remove/Install	2.0	1.000	2.000
Weld Prep.	1.0	0.650	0.650
HP Coverage	6.25	0.020	0.125
Nozzle-to-Vessel Inspection (UT)	4.0	0.850	3.400
Nozzle Inside Radius Inspection (UT)	3.0	0.850	2.550
Circumferential/Tube-sheet Inspection-(UT)	2.0	0.850	1.700
Welded Attachment Inspection (PT)	0.5	0.850	0.425
Total Estimate	26.05		14.100

The licensee's Man-Rem estimate for performing Code-required examination of 6 terminal end welds at the lower heat exchanger only follows:

Work Task	Man-Hours (hrs)	Dose Rate (R/hr)	Man-Rem
Insulation Remove/Install	1.80	0.500	0.900
Scaffolding Install/Remove	0.00	0.300	0.000
Clamp			

Work Task (con't)	Man-Hours (hrs)	Dose Rate (Rems(R)/hr)	Man-Rem
Remove/Install	2.00	1.000	2.000
Weld Prep.	0.33	0.650	0.215
HP Coverage	2.25	0.020	0.045
Nozzle-to-Vessel Inspection (UT)	1.20	0.850	1.020
Nozzle Inside Radius Inspection (UT)	0.90	0.850	0.765
Circumferential/Tubesheet Inspection (UT)	0.60	0.850	0.510
Welded Attachment Inspection (PT)	0.15	0.850	0.128
Total Estimate	9.23		5.582

2.7.4 Licensee's Proposed Alternative Examination (as stated):

"Technical Specifications require that the RCS Leak Rate be limited to 1 gallon per minute unidentified leakage. This value is calculated every 72 hours in accordance with Technical Specification requirements. Additionally, the containment atmosphere particulate radioactivity is monitored every 12 hours per Technical Specification requirements. As a result, new leakage is rapidly identified and located during operation. Leakage identified from these components can be easily isolated by two upstream valves with manual operation from within the control room. The valves also receive an automatic control signal to close on inventory loss based on pressurizer level. However, these valves could not be used as the Class 1 boundary valves due to their nonsafety-related actuation. Correspondingly, as a result of the reclassification to Class 1, these components will receive a system leakage test prior to start up after each refueling outage. During this system leakage test the components will receive a visual (VT-2) examination.

"The support structures will receive a visual (VT-3) examination to the extent required by the Code without insulation removal.

"Your evaluation of our original relief request, dated August 7, 1995, added alternative requirements. The appropriate portion of the Technical Evaluation Report follows:

> Based on the statement by the licensee that previous partial examinations have been completed on these welds, it is concluded that a best effort volumetric examination of the lower RHX, in addition to system radiation monitoring and the Code required visual examinations, would provide a reasonable assurance of the system's inservice structural integrity. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), it is recommended that relief be

granted provided the lower RHX vessel receives Code-required volumetric examinations to the extent possible.

"As such, Code required volumetric examinations will be performed on the lower RHX vessel to the extent possible by removing the insulation necessary to examine the welds in the as found arrangement."

2.7.5 Staff Evaluation:

The NRC staff has reviewed the information concerning the ISI Program Request for Relief NDE-7 for the third 10-year ISI interval of NAPS-1 pertaining to the volumetric examination of welds in the vessel head, nozzle connection, tubesheet-to-vessel shell, and nozzle inside radius area of the RHX (1-CH-E-3) and surface examination for welded attachments to the vessel. As stated by the licensee, the nozzle-to-vessel welds and nozzle inside radius sections for this vessel were not designed for meaningful ultrasonic examination, and only a limited portion of the vessel head circumferential welds and tubesheet welds have accessibility for the Code-required volumetric examination. For complete examination coverage, modification of nozzle-to-vessel welds and removal of existing support clamps would be necessary. Further, imposition of these requirements would cause a considerable burden and would result in licensee personnel receiving an estimated radiation dose of about 14 man-rem to examine the RHX . Thus, the licensee has requested relief from all nondestructive examinations associated with the RHX, and proposed an alternative to perform the RCS leak rate surveillance and the containment atmosphere particulate radioactivity monitoring as required by the Technical Specifications, and to perform a system leakage test and visual examination (VT-2 on RHX components and VT-3 on support structures) prior to start up after each refueling outage. In addition, the licensee stated that it will perform the Code-required volumetric examinations on the lower RHX vessel to the extent possible by removing the insulation necessary to examine the welds in the as-found arrangement.

The staff finds that the results of the partial examinations of the lower vessel continue to be satisfactory and that the imposition of the Code-required examinations of the remaining RHX welds would be impractical to accomplish. This examination and the Technical Specification requirements for leakage and radiation monitoring will provide reasonable assurance that continued inservice structural integrity will be maintained. Therefore, the Request for Relief NDE-7 is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the third 10-year ISI interval at NAPS-1, provided that the lower RHX vessel receives the Code-required volumetric examinations to the extent possible.

2.8 Request for Relief NDE-8, Examination Category C-F-2, Item C5.81, Pertaining to Branch Connection Welds in Main Steam Relief Headers

2.8.1 Code Requirement:

The 1989 Edition of the ASME Code, Section XI, Table IWC-2500-1, Examination Category C-F-2 (pressure-retaining welds in carbon or low alloy steel piping), Item C5.81, requires 100-percent surface examination of circumferential pipe branch connection welds, as defined by Figures IWC-2500-9 to -13, during each 10-year ISI interval.

2.8.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100-percent surface examination coverage of circumferential pipe branch connection welds listed below for main steam relief headers during the third 10-year ISI interval:

Drawing No.	Weld Nos.
11715-WMKS-0101A-1	SW-52 to SW-56
11715-WMKS-0101A-2	SW-15 to SW-17 and SW-40W to SW-41W
11715-WMKS-0101A-3	SW-32W to SW-35W and SW-18W

2.8.3 Licensee's Basis for Relief Request (as stated):

"The design of the main steam relief header branch connection welds calls for the use of a reinforcement pad. These pads are fillet welded and completely encase the branch connection welds."

2.8.4 Licensee's Proposed Alternative Examination (as stated):

"A surface examination of the reinforcement pad's fillet welds associated with one branch connection weld will be performed during the interval."

2.8.5 Staff Evaluation:

The NRC staff has reviewed the information concerning the ISI Program Request for Relief NDE-8 for the third 10-year ISI interval of NAPS-1 pertaining to the 100-percent surface examination of circumferential branch connection welds in main steam relief headers during each inspection interval. As stated by the licensee, these branch connection welds are completely encased under reinforcement pads, making them inaccessible for the Code-required surface examination.

The licensee proposed to perform a surface examination of the reinforcement pad's fillet welds associated with one branch connection weld during the interval as an alternative. Since the reinforcement pad fillet welds are supplementing the branch connection welds to safeguard the main steam pressure boundary, continued structural integrity is assured, and the overall level of plant quality and safety will not be compromised. These examinations will provide reasonable assurance that inservice flaws, if developed in the fillet welds, will be detected. In addition, branch connections of a common header are similar in design, size, function, and service. Examination of the pad fillet welds associated with one branch connection weld in this case is a reasonable sample. Therefore, Request for Relief NDE-8 is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the third ISI interval, provided that the surface examination of the fillet welds for the reinforcement pads associated with one branch connection weld be performed during the interval.

2.9 Request for Relief NDE-9, Examination Category C-F-2, Item C5.81, Pertaining to Service Water System Piping and Welds

This relief request will be evaluated separately, and the evaluation will be transmitted under separate cover.

2.10 Request for Relief NDE-10, Examination Categories B-H, B-K-1, C-C, D-A, D-B, and D-C, Pertaining to Class 1, 2, and 3 Integrally Welded Attachments

2.10.1 Code Requirement:

The 1989 Edition of the ASME Code, Section XI, Tables IWB-2500-1, IWC-2500-1 and IWD-2500-1, Examination Categories B-H, B-K-1, C-C, D-A, D-B AND D-C, requires 100-percent examination coverage, volumetric or surface as applicable, of Class 1, 2, and 3 integrally welded attachments during each ISI interval. It also sets requirements for base metal design thickness on Class 1 and 2 attachments, but not on Class 3 attachments.

Code Case N-509, "Alternative Rules for the Selection and Examination of Class 1, 2, and 3 Integrally Welded Attachments," allows reduced examination coverage and consistent selection criteria among Class 1, 2, and 3 integrally welded attachments.

2.10.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required 100-percent examination coverage of Class 1, 2, and 3 integrally welded attachments by seeking NRC approval to implement Code Case 509 as alternative rules for the selection and examination of these attachment welds. The licensee requested that relief be granted for the inservice examination to be performed during the third 10-year ISI interval.

2.10.3 Licensee's Basis for Relief Request (as stated):

"Code Case N-509, Alternative Rules for the Selection and Examination of Class 1, 2, and 3 Integrally Welded Attachments, Section XI, Division 1, is not currently approved by Regulatory Guide 1.147 for use. 10 CFR 50.55[a] footnote 6 notes that the use of other Code Cases may be authorized by the Director of the Office of Nuclear Reactor Regulation upon request pursuant to 10 CFR 50.55[a](a)(3). As such, Code Case N-509 is requested for use on North Anna Unit 1 in the [third] inspection interval.

"The current Code requires a certain size base material design thickness before examination is required on Code Class 1or 2 integrally welded attachments. This size limitation is apparently arbitrary with no technical basis. The current Code also has no inspection requirements for Class 1 integrally welded attachments for piping, pumps, and valves (B-K-1) for the third inspection interval Inspection Program B (North Anna's). Additionally, there is no selection criteria for Class 3 nonexempt integrally welded attachments, requiring 100% examination. These deficiencies have been corrected in Code Case N-509.

"This relief request was submitted and approved for the Second Inservice Interval at NAPS Unit 1. The relief was granted with conditions per NRC letter No. 95-446 Dated 08/18/95.

Relief was granted provided that at least 10% of all integral attachments were scheduled for examination."

2.10.4 Licensee's Proposed Alternative Examination (as stated):

"Code Case N-509 will be used in its entirety. Further, at least 10% of all integral attachments will be scheduled for examination. Code Case references to the 90 Addendum of ASME Section XI are the same as the provisions in Code Case N-491, which has been implemented by our support programs."

2.10.5 Staff Evaluation:

The NRC staff has reviewed the information concerning the ISI Program Request for Relief NDE-10 for the third 10-year ISI interval of NAPS-1 pertaining to integrally welded attachments. As indicated in NRC Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 12, dated May 1999, the NRC has found Code Case N-509 acceptable subject to the condition that, in addition to those conditions specified in the Code Case, a minimum 10-percent sample of integrally welded attachments for each item in each Code class per interval should be examined. As stated by the licensee, Code Case N-509 will be used in its entirety and at least 10 percent of all integral attachments will be scheduled for examination during the third ISI interval in NAPS-1. Therefore, the licensee's Request for Relief NDE-10 is not necessary.

2.11 Request for Relief NDE-11, Examination Categories B-J, C-F-1, and C-F-2, Pertaining to Class 1 and 2 Longitudinal Piping Welds

2.11.1 Code Requirement:

The 1989 Edition of the ASME Code, Section XI, Tables IWB-2500-1 and IWC-2500-1, Examination Categories B-J, C-F-1, and C-F-2, requires a certain specified weld length be examined for Class 1 and Class 2 piping longitudinal welds.

Code Case N-524, "Alternative Examination Requirements for Longitudinal Welds in Class 1 and 2 Piping, Section XI, Division 1," reduces the examination coverage on longitudinal welds, but with more examination effort at intersections of longitudinal and circumferential welds.

2.11.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required examination coverage of Class 1 and 2 longitudinal piping welds by seeking NRC approval to implement Code Case N-524 as alternative rules for examination of these longitudinal piping welds. The licensee requested that relief be granted for the inservice examination to be performed during the third 10-year ISI interval.

2.11.3 Licensee's Basis for Relief Request (as stated):

"Section XI of the ASME Boiler and Pressure Vessel Code, 1989 Edition, currently requires one pipe diameter in length, but no more than 12 inches, be examined for Class 1 longitudinal piping welds. Class 2 longitudinal piping welds are required to be examined for a length of 2.5t,

where “t” is the thickness of the weld. These lengths of weld are measured from the intersection of the circumferential weld and longitudinal weld. Code Case N-524 significantly reduces the required examination volume or surface area. It does this by limiting the examination requirements of the intersecting circumferential weld. This would include the weld and one-half (½) inch on both sides of the weld crown for surface examinations, and one-quarter (1/4) inch on both sides of the weld crown for volumetric examinations in the lower one-third (1/3) weld volume. Code Case N-524 directs the examination effort at the high risk area associated with the weld intersections. It eliminates low risk areas on the longitudinal weld from examination, significantly reducing examination time and radiation exposure to examination personnel. Compliance with the existing ASME Section XI requirements, in lieu of the Code Case, results in unnecessary personnel radiation exposure to complete the required examinations without a compensating increase in the level of quality or safety.

“Code Case N-524 was previously approved for use at North Anna for the second ten-year interval per NRC letter 94-602 dated 10/03/94.”

2.11.4 Licensee’s Proposed Alternative Examination (as stated):

“Code Case N-524 will be implemented in its entirety.”

2.11.5 Staff Evaluation:

The NRC staff has reviewed the information concerning the ISI Program Request for Relief NDE-10 for the third 10-year ISI interval of NAPS-1 pertaining to Class 1 and 2 longitudinal pipeline welds. As stated in NRC Regulatory Guide 1.147, “Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 12, dated May 1999, the NRC has found Code Case N-524 acceptable. Therefore, Request for Relief NDE-11 is not necessary.

2.12 Request for Relief NDE-12, Pertaining to Snubbers and Safety/Relief Valves Within the Scope of ASME Code, Section XI

2.12.1 Code Requirement:

The 1989 Edition of the ASME Code, Section XI, Article IWA-7000 specifies requirements for replacement of items. IWA-7000 requires that the system having an item removed for replacement (or for a snubber or relief valve removed for testing) should remain out of service for the time that the item is removed, until the replacement item has been installed (or the tested item has been reinstalled) and qualified with the appropriate preservice inspection and hydrostatic test.

Code Case N-508-1, “Rotation of Serviced Snubbers and Pressure Relief Valves for the purpose of Testing,” allows a spare item to be temporarily installed as replacement for the snubber or relief valve removed for testing, until the removed item has completed testing and been reinstalled, such that the system can remain in service.

2.12.2 Licensee’s Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code requirements of IWA-7000 and requested implementation of Code Case N-508-1 as alternative rules for

snubbers and safety/relief valves removed for testing. The licensee requested that relief be granted for the inservice examination to be performed during the third 10-year ISI interval.

2.12.3 Licensee's Basis for Relief Request (as stated):

"Currently, when a snubber or relief valve is removed for testing, the activity is required to be treated like an ASME Section XI, Article IWA-7000 replacement activity. This entails the use of replacement programs, review by an Authorized Nuclear Inservice Inspector, and preparation/maintenance of a NIS-2 form. This activity requires the degraded system to remain out of service for the time that the item is removed, tested and reinstalled. The use of Code Case N-508-1, when a snubber or pressure relief valve is removed from a system for the purpose of testing, would allow a spare component to be put into place of the removed component, and to test the removed component at a later time. This minimizes the time that a degraded system remains out of service. The use of Code Case N-508-1 will not negate the existing snubber service life monitoring program. The use of Code Case N-508-1 will provide an acceptable level of quality and safety, and assurance of snubber reliability will be maintained."

2.12.4 Licensee's Proposed Alternative Examination (as stated):

"Code Case N-508-1 will be implemented in its entirety."

2.12.5 Staff Evaluation:

The NRC staff has reviewed the information concerning the ISI Program Request for Relief NDE-12 for the third 10-year ISI interval of NAPS-1 pertaining to the proposed use of the alternative requirements in Code Case N-508-1. The Code Case permits the rotation of previously installed snubbers and relief valves installed on components without the need for a Repair/Replacement Plan, an Authorized Inspector, or an NIS-2 Data Report, provided that the snubber or relief valve is removed from the component only for testing. The installation of a spare snubber or relief valve is a temporary replacement for the removed component, such that the system can maintain continued service until the original is reinstalled. The staff finds that this does not represent a reduction in safety since the removed snubber or relief valve undergoes testing to confirm its ability to meet the design requirement and/or to detect any service-related degradation. Should any failure be detected, the scope of the examination will be expanded and the provisions for repair/replacement in the Code would be invoked. The licensee must maintain traceability and ensure that the items being temporarily installed are of the same design and construction. The proposed alternatives in Code Case N-508-1 provide an acceptable level of quality and safety. Therefore, the staff finds that the alternatives in Request for Relief NDE-12 are authorized pursuant to 10 CFR 50.55a(a)(3)(i).

2.13 Request for Relief NDE-13, Pertaining to All Components Inspected under ASME Code, Section XI ISI Program

2.13.1 Code Requirement:

The 1989 Edition of the ASME Code, Section XI, Article IWA-2430(d), for components inspected under Program B (IWA-2432), states that each of the inspection intervals may be

extended or decreased by as much as 1 year. Adjustments shall not cause successive intervals to be altered by more than 1 year from the original pattern of intervals.

Code Case N-535, "Alternative Requirements for Inservice Inspection Intervals," allows both interval and period extensions, and a successive interval may start prior to the end of the previous interval that was extended to enable an inspection to coincide with a plant outage.

2.13.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code requirements of IWA-2432(d) and requested approval of implementation of Code Case N-535 as alternative rules for all components inspected under ASME Code, Section XI for more scheduling flexibility in completing interval inspection. The licensee requested that relief be granted for the inservice examination to be performed during the third 10-year ISI interval.

2.13.3 Licensee's Basis for Relief Request (as stated):

"Code Case N-535, Alternative Requirements for Inservice Inspection Intervals, is not currently approved for use by Regulatory Guide 1.147, Inservice Inspection Code Case Acceptability ASME Section XI Division 1. Footnote 6 of 10 CFR 50.55a states that other Code Cases may be authorized upon request pursuant to 10 CFR 50.55a(a)(3). In accordance with these provisions, permission is requested to utilize Code Case N-535 in North Anna's ASME Section XI Program.

"Code Case N-535 interprets interval inspection scheduling requirements and allows both interval and period extensions of up to one year to enable an inspection to coincide with a plant outage. Application of this Code Case would provide additional scheduling flexibility in completing interval inspections. The Code Case allows examinations to be performed to satisfy requirements of the extended interval in conjunction with examinations performed to satisfy requirements of the successive interval. However, an examination performed to satisfy requirements of either the extended interval or the successive interval shall not be credited to both intervals.

"The use of this Code Case has been previously approved for North Anna Units 1 and 2 by NRC Letter 98-340, Dated 5/29/98."

2.13.4 Licensee's Proposed Alternative Examination (as stated):

"Code Case N-535 may be implemented in its entirety."

2.13.5 Staff Evaluation:

The NRC staff has reviewed the information concerning the ISI Program Request for Relief NDE-13 submitted in the letter dated April 8, 1999, for the third 10-year ISI interval of NAPS-1 pertaining to all components inspected under ASME Code, Section XI. Paragraph IWA-2432 of ASME Code, Section XI requires that successive inspection intervals be comprised of 10 years following the previous interval except as modified by Paragraph IWA-2430(d). Paragraph IWA-2430(d) allows an interval to be extended or reduced by as much as 1 year to coincide

with an outage, thus changing the length of an interval. The licensee-proposed alternative is to implement Code Case N-535, which consists of the following guidance:

a) Allow a 1-year extension of inspection interval. Also, a successive interval may start prior to the end of the previous interval that was extended.

b) Prohibit examinations performed as part of the extended interval from being credited in the successive interval.

c) Allow an inspection period to be extended or reduced to coincide with an outage.

d) Require examination records to identify in what interval the examination was performed.

The licensee proposes to apply the requirements of Code Case N-535 in its entirety for the scheduling of intervals and examinations of Code Class 1, 2, and 3 piping and components. This is in lieu of the existing Code requirements of Paragraph IWA-2432 as modified by Paragraph 2420(d).

Parts (a) and (c) of the case are the actual changes from current Section XI requirements, and (b) and (d) only clarify existing requirements. Since plant operation cycles are independent from ISI cycles, the changes will provide ISI scheduling flexibility for making ISI cycles more adaptable to the plant outage schedule, and do not actually change the total number of examinations, examination technology used, acceptance criteria, or any other Code requirements on ISI. The staff believes that Code Case N-535 provides an acceptable level of quality and safety. Therefore, the licensee's alternative in Request for Relief NDE-13 is authorized pursuant to 10 CFR 50.55a(a)(3)(i).

2.14 Request for Relief NDE-14, Examination Category B-G-1, Item B6.10, Pertaining to Reactor Vessel Closure Head Nuts

2.14.1 Code Requirement:

The 1989 Edition of the ASME Code, Section XI, Table IWB-2500-1, Examination Category B-G-1 (pressure-retaining bolting, greater than 2 inches in diameter), Item B6.10, requires a surface examination of all the reactor vessel closure head nuts during every ISI interval.

2.14.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required surface examination of reactor vessel closure head nuts listed below,

Mark No.	Component No.	Drawing No.	Class
N-01 thru N-58	1-RC-R-1	11715-WMKS-RC-R-1.4	1

to replace the surface examination with a visual examination (VT-1) with additional normally scheduled visual (VT-2) examination during a system leakage test in each refueling outage, Technical Specification-required calculation once per 72 hours of reactor coolant leak rate, and

containment atmosphere radioactivity check every 12 hours. The licensee requested that relief be granted for the inservice examination to be performed during the third 10-year ISI interval.

2.14.3 Licensee's Basis for Relief Request (as stated):

"The 1989 Addenda of ASME Section XI Table IWB-2500-1, examination category B-G-1, item number B6.10 has changed the requirements from a surface examination to a visual (VT-1) examination.

"Extensive cleaning of these nuts is required for a surface examination to be performed. This extensive cleaning results in additional costs and the inefficient use of available manpower resources.

"Due to design factors, the stripping areas of the female threads in a nut are approximately 1.3 times the areas of the mating male threads (see ASME B1.1, Unified Inch Screw Threads). Accordingly, if a defect were to be developed during service, they would occur in the threads of the bolt or stud before developing in the nut's threads because of higher stresses in the male threads. When reactor vessel head fasteners are tightened for closure or loosened for opening, the studs are tensioned and the nuts are run on the threads with no load as the load is taken by the stud or bolt through the tensioning device.

"This relief was previously granted for the second interval at North Anna Unit 1 per NRC Letter No. 97-683, Dated 11/14/97."

2.14.4 Licensee's Proposed Alternative Examination (as stated):

"It is proposed that the requirements of the 1989 Addenda of ASME Section XI Table IWB-2500-1, examination category B-G-1, item number B6.10 (visual, VT-1) be substituted for the Code surface examination. In addition:

1. A visual (VT-2) examination will be performed during the normally scheduled system leakage test each refueling outage;

2. Technical Specifications require that the reactor coolant system leak rate be limited to one gallon per minute unidentified leakage. This value is calculated at least once per 72 hours; and

3. The containment atmosphere particulate radioactivity is checked every 12 hours.

"The proposed alternative examinations stated above will ensure that the overall level of plant quality and safety will not be compromised."

2.14.5 Staff Evaluation:

The NRC staff has reviewed the information concerning the ISI Program Request for Relief NDE-14 submitted in the letter dated April 8, 1999, for the third 10-year ISI interval of NAPS-1 pertaining to reactor vessel closure head nuts. The Code requires that all the nuts have surface examination during each inspection interval. The licensee has proposed to perform a VT-1 visual examination of reactor vessel closure head nuts in lieu of the Code-required surface

examination. The staff reviewed the requirements of various editions of the applicable ASME Code related to the examination of nuts greater than 2 inches in diameter in Examination Category B-G-1, and noted the following:

- For the reactor vessel closure head nuts under the applicable criteria, a surface examination is specified as the examination requirement in Table IWB-2500-1; however, there is neither any further clarification of the examination method to be used for meeting the requirement, nor acceptance standard, nor the specification of required surface that needs examination. These items were under preparation by the ASME at that time, and, therefore, were subject to owner's evaluation with no guidance from the Code. For the nuts used in other Class 1 components, such as steam generators, pressurizer, heat exchangers, piping, pumps and valves, the examination method has always been a VT-1 visual examination.

- Subsequently, the 1989 Addenda to the ASME Code, Section XI, proposed as an alternative by the licensee, clarified the method of surface examination to VT-1 visual examination for reactor vessel closure head nuts. This is consistent with the examination method used for the other Class 1 components discussed above. The Addenda to the Code also specified detailed acceptance standard and the required surface for the VT-1 visual examination.

Therefore, the staff has determined that a VT-1 visual examination combined with the stringent acceptance criteria stated in IWB-3517, plus visual VT-2 during normally scheduled system leakage test, leak rate monitoring under Technical Specification, and containment atmosphere particulate radioactivity check, meets the 1989 Addenda of the Code and provides an acceptable level of quality and safety with respect to ensuring adequate structural integrity and leaktightness of the nuts. Therefore, the alternative proposed in Request for Relief NDE-14 is authorized pursuant to 10 CFR 50.55a(a)(3)(i).

2.15 Request for Relief SPT-1, Examination Categories B-E and B-P, Items B4.13, B15.10 and B15.11, Pertaining to Welds and Pressure Boundary at Bottom of Reactor Vessel

2.15.1 Code Requirement

The 1989 Edition of the ASME Code, Section XI, Table IWB-2500-1, Examination Category B-E, Item 4.13, requires reactor vessel partial penetration welds at instrumentation nozzles to have a visual VT-2 examination during the system hydrostatic test. In addition, Category B-P, Items B15.10 and B15.11, require a visual VT-2 examination of the bottom of the reactor vessel during the system leakage test and the system hydrostatic test.

2.15.2 Licensee’s Code Relief Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code-required visual VT-2 examination at the bottom of the reactor vessel, including examinations at pressure boundary and instrumentation nozzle partial penetration welds, during system hydrostatic tests and system leakage tests. The licensee requested that relief be granted for the VT-2 examination to be performed when containment is at atmospheric conditions each refueling during the third 10-year ISI interval.

2.15.3 Licensee's Basis for Relief Request (as stated):

"In order to meet the Section XI pressure and temperature requirements for the system leakage and system hydrostatic tests of the reactor vessel, reactor containment at North Anna Unit [1] is required to be at a subatmospheric pressure. Station administrative procedures require that self contained breathing apparatus be worn for containment entries under these conditions. This requirement significantly complicates the visual (VT-2) examination of the bottom of the reactor vessel during testing. Access to the bottom of the reactor vessel requires that the examiner descend several levels by ladder and navigate a small entrance leading to the reactor vessel. In addition to these physical constraints, the examiner must contend with extreme environmental conditions: elevated air temperatures due to reactor coolant at temperatures above 500 degrees F and limited air circulation in the vessel cubicle. In addition, the examiner is limited to the approximate 30 minute capacity of the breathing apparatus for containment entry, the VT-2 examination, and containment exit."

2.15.4 Licensee's Proposed Alternative Examination (as stated):

"Technical Specifications require that the Reactor Coolant System Leak Rate be limited to 1 gallon per minute unidentified leakage. This value is calculated at least once per 72 hours. Additionally the containment atmosphere particulate radioactivity is monitored every 12 hours. The incore sump room has a level alarm in the control room requiring operator action. These actions would identify any integrity concerns associated with this area. A VT-2 examination will be conducted when containment is at atmospheric conditions each refueling for evidence of boric acid corrosion."

2.15.5 Staff Evaluation:

The NRC staff has reviewed the information concerning the ISI Program Request for Relief SPT-1 submitted in letters dated April 8, 1999, and January 21, 2000, for the third 10-year ISI interval of NAPS-1 pertaining to visual VT-2 examination at the bottom of the reactor vessel, including examinations at pressure boundary and instrumentation nozzle partial penetration welds. Since the containment building is at subatmospheric conditions during the system hydrostatic and leakage tests, the examiner must wear self-contained breathing apparatus that limits his work duration and mobility. In addition to these physical constraints, the examiner must contend with high ambient temperatures. Thus, the imposition of the examination requirements would cause a considerable burden on the licensee.

The licensee proposed, as an alternative, to perform a VT-2 examination for evidence of boric acid corrosion when the containment is at atmospheric conditions during refueling. In addition, the licensee noted that the Technical Specifications require the monitoring of reactor coolant leak rate, atmospheric particulate radioactivity, and containment sump level. Therefore, the staff has determined that the VT-2 examination for evidence of boric acid corrosion conducted during each refueling outage provides a reasonable assurance of leaktight integrity. The staff concludes that the Code-required examinations at the bottom of the reactor vessel during system leakage and hydrostatic tests would result in a hardship without a compensating increase in the level of quality and safety. Therefore, the alternative examination in Request for Relief SPT-1 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii).

2.16 Request for Relief SPT-2, Pertaining to Hydrostatic Testing of Class 1, 2, and 3 Components Following Repairs or Installation of Replacement Items by Welding

2.16.1 Code Requirement:

The 1989 Edition of the ASME Code, Section XI, Articles IWA-4000 and IWA-5214 require a hydrostatic pressure test in accordance with IWB-5000, IWC-5000, and IWD-5000 following welded repairs or installation of replacement items by welding. Code Case N-416-1, "Alternative Pressure Test Requirement for Welded Repairs or Installation of Replacement Items by Welding," allows that, in lieu of the hydrostatic pressure test, a system leakage test may be used.

2.16.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code requirements of IWA-4000 and IWA-5214 for performing a hydrostatic pressure test following a welded repair or welded replacement, and requested an option of implementation of Code Case N-416-1 as alternative rules for Class 1, 2, and 3 components. The licensee requested that relief be granted for the inservice examination to be performed during the third 10-year ISI interval.

2.16.3 Licensee's Basis for Relief Request (as stated):

"In past situations our utility has been required to defer or ask relief from ASME Section XI hydrostatic tests following repair or replacement activities due to various reasons, which identified a basis of impracticality. This has ranged from boundary valve isolation problems to incorporation of the steam generators in the test boundary. These situations have necessitated in some cases immediate communication with and approval from the NRC, so that start-up delays or LCO conditions could be avoided. Test deferrals, like those associated with the steam generator, eventually must be conducted, and are considered inordinately burdensome, considering that the 10-year hydrostatic tests have been eliminated for Class 1 and 2 systems with the approval in Regulatory Guide 1.147 of Code Case N-498, "Alternative Rules for 10-year Hydrostatic Pressure Testing for Class 1 and 2 Systems, Section XI, Division 1." The Code has recognized that alternative rules should be available to hydrostatic testing to allow an option to the owner. They have developed Code Case N-416-1, "Alternative Pressure Test Requirement for Welded Repairs or Installation of Replacement Items by Welding." Accordingly, it is considered impractical to maintain only the hydrostatic option."

2.16.4 Licensee's Proposed Alternative Examination (as stated):

"In situations following welded repairs or installation of replacement items by welding, when the hydrostatic test required by IWA-4000 or IWA-5214 is not performed, the alternative pressure test outlined in Code Case N-416-1 shall be applied. Additional surface examinations will be performed on the root (pass) layer of butt and socket welds on the pressure retaining boundary of Class 3 components when the surface examination method is used in accordance with the applicable Subsection of ASME Section III.

"Use of this alternative will be documented on the NIS-2 Form."

2.16.5 Staff Evaluation

The NRC staff has reviewed the information concerning the ISI Program Request for Relief STP-2 for the third 10-year ISI interval of NAPS-1 pertaining to the use of the alternative pressure test requirements in Code Case N-416-1. As indicated in NRC Regulatory Guide 1.147, “Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 12, the NRC has found Code Case N-416-1 acceptable subject to the following condition in addition to those conditions specified in the Code Case. Additional surface examinations should be performed on the root (pass) layer of butt and socket welds of the pressure-retaining boundary of Class 3 components when the surface examination method is used in accordance with Section III. Since the staff has found Code Case N-416-1 to be acceptable with the addition of the noted condition, NRC authorization of Request for Relief SPT-2 is not necessary.

2.17 Request for Relief SPT-3, Pertaining to the Use of ASME Code Case N-498-1

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code requirements of IWB-5000, IWC-5000 and IWD-5000 for hydrostatic test with Code-specified test pressure, which is higher than the nominal operating pressure of a component. The licensee proposed to implement Code Case N-498-1 as alternative rules, which allow performing the hydrostatic test at the nominal operating pressure of the component.

As stated in NRC Regulatory Guide 1.147, “Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1," Revision 12, the NRC has found Code Case N-498-1 acceptable. Therefore, Request for Relief SPT-3 is not necessary.

2.18 Request for Relief SPT-4, Category B-P, Items B15.51 and B15.71 Pertaining to Small Diameter (Equal or less than 1") Class 1 Pressure-Retaining Piping and Instrumentation Connections

2.18.1 Code Requirement:

The 1989 Edition of the ASME Code, Section XI, Table IWB-2500-1, Examination Category B-P, Items B15.51 and B15.71, require system hydrostatic testing and associated visual (VT-2) examination of all Class 1 pressure boundary piping, connections, and valves.

2.18.2 Licensee’s Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from the Code requirements of performing hydrostatic testing and associated visual examination of small diameter piping, connections, and valves, within the ASME Class 1 pressure boundary during each 10-year ISI interval. The licensee proposed, as an alternative, to visually examine the RCS vent, drain, instrumentation, and sample connections with the isolation valves in normally closed position. The licensee requested that relief be granted for the inservice examination to be performed for the remainder of the third 10-year ISI interval.

2.18.3 Licensee's Basis for Relief Request (as stated):

"These piping segments are equipped with valves, or valve and flange, that provide for double isolation of the reactor coolant system (RCS) pressure boundary. These components are generally maintained closed during normal operation and the piping outboard of the first isolation valve is, therefore, not normally pressurized. The proposed alternative provides an acceptable level of safety and quality based on the following:

(1) ASME Section XI Code, paragraph IWA-4700, provides the requirements for hydrostatic pressure testing of piping and components after repairs by welding to the pressure boundary. IWA-4700(b)(5) excludes component connections, piping, and associated valves that are 1 inch nominal pipe size and smaller from the hydrostatic test. Consequently, hydrostatic testing and the associated visual examination of these $\leq$1 inch diameter RCS vent/drain/sampling connections once each 10-year interval is unwarranted considering that a repair weld on the same connections is exempted by the ASME XI Code.

(2) The non-isolable portion of the RCS vent and drain connections will be pressurized and visually examined as required. Only the isolable portion of these small diameter vent and drain connections will not be pressurized.

(3) All piping connections are typically socket-welded, and the welds received a surface examination after installation. The piping and valves are nominally heavy wall (schedule 160 pipe and 1500# valve bodies). The piping and valve/flanges are toward the free end of a cantilever configuration (stub end isolated by either a valve or a flange). There is no brace or support for this portion of the pipe. Consequently, this portion does not experience any thermal loading. This portion of the line is isolated during normal operation and does not experience pressure loading unless there is a leak at the first isolation valve. The valves do not have an extended operator, so the rotational accelerations at the valve do not produce significant stress. Since the lines are designed to the Code, the stresses toward the free end of the cantilever due to other types of loading are only a small fraction of the applicable Code allowable. As a result, this portion of the lines is not subjected to high stress or high intensity cyclic loading.

"The Technical Specifications (TS) require RCS leakage monitoring (TS 4.4.6.2.1) during normal operation. Should any of the TS limits be exceeded, then appropriate corrective actions, which may include shutting the plant down, are required to identify the source of the leakage and restore the RCS boundary integrity.

"During the 1998 North Anna Unit 1 refueling outage similar piping segments were pressurized by removing a flange and connecting a test rig. A majority of these piping segments are located in close proximity to the RCS main loop piping thus requiring personnel entry into high radiation areas within the containment. The dose associated with this testing was 1.5 man-rem."

2.18.4 Licensee's Proposed Alternative Examination (as stated):

"As an alternative to the Code-required hydrostatic test of the subject Class 1 reactor coolant system pressure boundary connections the following is proposed:

1. The RCS vent, drain, instrumentation, and sample connections will be visually examined for leakage, and any evidence of past leakage, with the isolation valves in the normally closed position each refueling outage during the ASME XI Class 1 System Leakage Test (IWB-5221).

2. The RCS vent, drain, instrumentation, and sample connections will also be visually examined with the isolation valves in the normally closed position during the 10-year ISI pressure test (IWB-5222 and Code Case N-498-1). This examination will be performed with the RCS at nominal operating pressure and at near operating temperature after satisfying the required 4-hour hold time.

"In addition, during modes 1 through 4 the RCS will be monitored for leakage at the following frequency pursuant to TS requirements:

1. Every 72 hours, during steady state operation, the reactor coolant system leak rate will be monitored to assure the limit of one gallon per minute unidentified leakage is maintained.

2. Every 12 hours the containment atmosphere particulate radioactivity will be monitored.

"The proposed alternative stated above will ensure that the overall level of plant quality and safety will not be compromised."

2.18.5 Staff Evaluation:

The NRC staff has reviewed the information concerning the ISI Program Request for Relief SPT-4 submitted in the letter dated April 8, 1999, and revised in the letter dated August 20, 1999, for the third 10-year ISI interval of NAPS-1 pertaining to hydrostatic testing of Class 1 small diameter piping, connections, and valves. The Code requires that hydrostatic testing and associated visual examination be conducted once per 10-year ISI interval. The licensee-proposed alternative is to conduct a visual examination for evidence of leakage each refueling outage during the RCS leakage test, and during each 10-year ISI pressure test, and the tests are conducted at nominal operating pressure and temperature per Code Case N-498-1, with isolation valves in the normally closed position. As indicated in the staff evaluation of SPT-3 above, Code Case N-498-1 is acceptable. However, testing with the isolation valves in their normally closed position means that the portions of those small diameter piping and connections located between double isolation valves, which are part of the Class 1 pressure boundary, will not have the Code-required pressurization during the pressure tests. However, staff evaluation considered that this is acceptable based on the following:

1. The normally unpressurized piping segments are generally not subject to a harsh corrosive environment.

2. With likely less severe pressure and thermal loadings, and generally ample design margins for the small diameter piping and connections, through-wall cracking due to flaw growth is unlikely. Fatigue loading due to vibration is unlikely to lead to failure given the age of these units.

3. With routine monitoring of coolant leakage rate and containment air particulate radioactivity required by the plant Technical Specifications, any occurrence of leakage will likely be discovered in a timely manner and followed by appropriate corrective actions.

4. As reported by the licensee, these components are located inside containment and in close proximity to the reactor coolant loop piping where radiation levels are high. Therefore, imposition of Code requirements will expose plant personnel to high doses of radiation.

5. These systems are connected to low pressure systems with two isolation valves. When the system leakage test is performed at operating pressure and temperature, the portion of the piping beyond the first isolation valve up to the second valve is normally at a much lower pressure than RCS pressure. Opening the first isolation valve to extend the test boundary to the second valve would result in single valve protection of the reactor coolant boundary and may result in inadvertently pressurizing a low pressure system to RCS pressure if the second valve allows sufficient leakage. By maintaining the test boundary at the first isolation valve, any seat leakage past this valve would pressurize the space between the isolation valves for which relief is being sought but to a somewhat lower pressure than the RCS pressure. Thus, this will provide reasonable assurance of the leaktightness of the pressure boundary.

Therefore, the alternative in Request for Relief SPT-4 provides an acceptable level of quality and safety and is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the third 10-year ISI interval at NAPS-1. However, the NRC staff notes that this relief may not be applied to testing performed to satisfy requirements for post-repair or replacement testing of these isolation valves.

2.19 Relief Request SPT-5, Request to Use Code Case N-566-1 in Lieu of Code Requirement for Pressure-Retaining Bolted Connections Within the Scope of ASME Section XI

2.19.1 Code Requirement:

Per ASME Section XI, Division 1, paragraph IWA-5250(a)(2), when leakage is detected during the conduct of a system pressure test at a bolted connection, the bolting shall be removed and subjected to a VT-3 examination to detect evidence of corrosion, and evaluated in accordance with paragraph IWA-3100.

2.19.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requests to implement the provisions of Code Case N-566-1 "Corrective Action for Leakage Identified at Bolted Connections," as an alternative to the requirements of IWA-5250(a)(2).

2.19.3 Licensee's Basis for Relief Request (as stated):

"Using Code Case N-566-1 in lieu of Section XI of ASME Code, 1989 Edition, IWA-5250 (a)(2) allows for greater flexibility and prudent decisionmaking. Leaking conditions at a bolted connection may be an important variable in the degradation of fasteners. However, leakage is not the only variable, and in some cases may not be the degradation mechanism. Other

variables to be considered are: bolting materials; leaking medium; duration of the leak; and orientation of the leak (not all bolts may be wetted). These variables are important to consider before disassembling a bolted connection for a visual VT-3 examination. Removal of bolting at a mechanical connection may not be the most prudent decision and may cause undue hardship without a compensating increase in the level of quality or safety."

2.19.4 Licensee's Proposed Alternative to Code Requirements (as stated):

"Code Case N-566-1 shall be implemented in its entirety."

2.19.5 Staff Evaluation:

In accordance with the 1989 Edition of the ASME Code, Section XI, when leakage occurs at bolted connections, all bolting is required to be removed for VT-3 visual examination. In lieu of the Code-required removal of bolting to perform a VT-3 visual examination, the licensee has proposed to use Code Case N-566-1, which requires that the leakage be stopped and the joint integrity be reviewed. If the leakage is not stopped, the joint shall be evaluated in accordance with IWB-3142.4 for joint integrity. The evaluation for the specific case would consider number and service age of the bolts, bolt and component material, corrosiveness of process fluid, leakage location and system function, leakage history at the connection or other components, and visual evidence of corrosion at the assembled connection. This alternative allows the licensee to utilize a systematic approach and sound engineering judgment, provided that as a minimum, all of the evaluation factors listed in the Code Case are considered. Furthermore, if the joint is acceptable for continued service based on analytical evaluation, it shall be subsequently examined in accordance with IWB-2420(b) and (c).

Moreover, in accordance with the Code, the evaluation of bolting subject to VT-3 examination is done in accordance with IWA-3100, which corresponds to IWB-3100 for Class 1 and IWC-3100 for Class 2. By contrast, Code Case N-566-1 requires evaluation in accordance with IWB-3142.4 irrespective of the piping class that is more stringent than that of the Code. Therefore, the alternative use of the Code Case in lieu of the requirements of IWA-5250(a)(2) in regard to corrective action for leakage identified at bolted connections will provide an acceptable level of quality and safety, as the integrity of the joint will be maintained. The staff concludes that the licensee's proposed alternative to use Code Case N-566-1 is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for North Anna Station Unit 1 for the third 10-year ISI interval or until such time as Code Case N-566-1 is published in Regulatory Guide 1.147. At that time, if the licensee intends to continue to implement Code Case N-566-1, the licensee should follow all conditions specified in the Regulatory Guide, if present.

2.20 Relief Request SPT-6, Pertaining to Leakage at Bolted Connections

In its April 8, 1999, letter, as supplemented, the licensee stated that Request for Relief SPT-6 shall be considered withdrawn if the NRC staff grants Request for Relief SPT-5. Since the staff granted SPT-5 as previously discussed, no further action is necessary.

2.21 Relief Request SPT-7, System Pressure Test of Class 2 Piping That Penetrates the Containment Vessel Where the Piping and Isolation Valves Are Part of the Containment System but the Balance of Piping Is Outside of the Scope of Section XI

2.21.1 Code Requirement:

The 1989 Edition of the ASME Code, Section XI, Table IWC-2500-1, Examination Category C-H, Items C7.30 and C7.70, requires a system pressure test during each inspection period, and items C7.40 and C7.60 require a system hydrostatic test each inspection interval.

2.21.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requests that in lieu of the Code-required system pressure test during each inspection period and a system hydrostatic test at the end of each inspection interval, the penetration piping including the isolation valves will be local leak-rate tested in accordance with 10 CFR 50, Appendix J, Option B (performance-based requirements) at peak calculated containment pressure with provision for detection and location of leakage. The frequency of local leak-rate tests will be at least once every 60 months.

2.21.3 Licensee's Basis for Relief Request (as stated):

"The sole safety function of the piping and associated valves listed is to provide containment isolation. The components listed are part of the containment system. Containment penetrations are classified as Class 2 per ANSI 18.2, "Nuclear Safety Criteria for the Design of Stationary Pressurized Water Reactor Plants", section 2.3.1.2 (1). For the subject penetrations the connecting piping beyond the containment isolation valves serves no safety function and is classified as nonclass by the classification criteria used by Virginia Electric and Power Company for North Anna Unit 1.

"The ASME Section XI pressure testing requirements have verified leak-tight integrity by an over pressure test every ten years and a nominal operating test every inspection period. The 10-year hydrostatic tests were considered inordinately burdensome for the marginal benefit in safety they assure and have been eliminated by Code Case N-498, "Alternative Rules for 10-year Hydrostatic Pressure Testing for Class 1 and 2 Systems, Section XI, Division 1", which has been approved by Regulatory Guide 1.147, Inservice Inspection Code Case Acceptability ASME Section XI Division. The 10-year hydrostatic test is now conducted at nominal operating pressure.

"The subject penetrations are Type C pressure tested to a peak containment internal pressure of greater than or equal to 44.1 psig. This test is performed to satisfy Technical Specification Surveillance Requirement 4.6.1.2 which requires all containment penetrations to be leak rate tested as required by 10 CFR 50, Appendix J, Option B, as modified by approved exemptions, and in accordance with the guideline contained in Regulatory Guide 1.163, dated September 1995. The testing frequency of 10 CFR 50, Appendix J, Option B is performance based and can vary from 2 years to 5 years or three refueling cycles. This frequency will not coincide with the inspection period frequency required in Table IWC-2500-1 for system pressure tests and therefore, the ASME Code in effect at North Anna will require additional leak tightness testing.

"The ASME Section XI Code has acknowledged that testing of these components beyond the requirements of Appendix J is not necessary and issued Code Case N-522, "Pressure Testing of Containment Penetration Piping," to define its position.

"NUREG-1493, "Performance-Based Containment Leak-Test Program", concluded that prescriptive leak rate testing could be replaced with performance based requirements with only a marginal and acceptable impact on safety. The total cost of Type B (electrical penetrations) and Type C testing all containment penetrations (approximately 90 penetrations) was estimated to be $87,500 per outage for North Anna as reported in NUREG-1493. NUREG-1493 estimates that 5% of the total cost of Type B & C testing could be saved if the acceptance criteria were relaxed. Performing ASME Section XI pressure testing beyond the requirements of 10 CFR 50, Appendix J, Option B testing would cause Virginia Electric & Power Company to incur additional cost with a marginal gain in safety.

"This relief was previously approved for North Anna Power Station Unit 2 reference NRC Letter No. 97-290, dated 4/30/97 and Surry Power Station Units 1 and 2, reference NRC Letter No. 96-216, dated 4/16/96."

2.21.4 Licensee's Proposed Alternative (as stated):

"As an alternative to the testing frequency and pressures required by Table IWC-2500-1, Examination Category C-H, Items C7.30, C7.40, C7.60, and C7.70, the subject penetrations and associated piping and valves, will be pressure tested at peak containment calculated pressures to the requirements of 10 CFR Appendix J, as allowed by Code Case N-522. Testing will be performed in accordance with Technical Specification Surveillance Requirement 4.6.1.2 which requires all containment penetrations to be leak rate tested as required by 10 CFR 50, Appendix J, Option B, as modified by approved exemptions, and in accordance with the guideline contained in Regulatory Guide 1.163, dated September 1995.

"Methods for the detection and location of leakage at containment isolation valves and the pipe segments between the containment isolation valves will be identified in procedures.

"All subject penetrations will be Type C tested at least once every 60 months."

2.21.5 Staff Evaluation:

The licensee's proposed relief from the Code requirement is based on the use of Code Case N-522, "Pressure Testing of Containment Penetration Piping, Section XI, Division 1," with the condition that the test be conducted at the peak calculated containment pressure and the test procedure should permit detection and location of through-wall leakage in containment isolation valves (CIVs) and pipe segments between the CIVs. The NRC has approved use of Code Case N-522, with the stated conditions in Regulatory Guide 1.147, Revision 12, in May 1999. Therefore, NRC authorization of proposed Request for Relief SPT-7 is not necessary.

2.22 Relief Request SPT-8, Alternate Requirement for VT-2 Visual Examination of Class 1 and 2 Insulated Pressure-Retaining Bolted Connections

2.22.1 Code Requirement:

Subparagraph IWA-5242(a) states that for systems borated for the purpose of controlling reactivity, insulation shall be removed from pressure-retaining bolted connections for VT-2 visual examination conducted during the system pressure tests.

2.22.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requests relief from the Code requirement of conducting VT-2 visual examination of pressure-retaining bolted connections, with insulation removed, in RCS, charging, and safety injection systems located inside containment during the system pressure tests.

2.22.3 Licensee's Basis for Relief (as stated):

"A majority of these systems are located inside containment. In cases where there is no intermediate isolation from the RC [reactor coolant] system, the system pressure test is performed when the RCS [reactor coolant system] is greater than 500 degrees F, and the containment is subatmospheric. Removing and reinstalling insulation under these conditions is difficult to perform and deemed impractical when compared to the remainder of the pressure testing program. Further, in our response to IE Bulletin 82-02, we agreed to examine pressure retaining bolting on lines 4 inch NPS [nominal pipe size] and larger each refueling. In addition, in our response to NRC Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants", we committed to performing a visual examination of all accessible portions of systems containing boric acid anytime the unidentified leak rate exceeds a predetermined value, at every cold shutdown prior to decontaminating the containment, and during every reactor startup from Mode 5. Therefore, the requirement in IWA-5242(a) is a burden with no compensating increase in safety.

"This relief was previously approved for Surry Power Station Units 1 and 2, reference NRC Letter Nos. 95-404, dated 7-19-95 and 95-480 dated 8-30-95, respectively, and North Anna Power Station Unit 2, reference NRC Letter No. 92-730, dated 11-5-92."

2.22.4 Licensee's Proposed Alternative (as stated):

"As an alternative to the Code requirements, pressure retaining bolted connections on Class 1 systems tested during subatmospheric conditions, and within the scope of Section XI, will be visually examined each refueling outage at zero or static pressure. The examination will be performed with insulation removed.

"Pressure retaining bolted connections on Class 2 systems tested during subatmospheric conditions, and within the scope of Section XI, will be visually examined each refueling outage at zero or static pressure. The examination will be performed with insulation removed.

"The Code-required pressure testing will continue to be performed with a VT-2 examination performed with the insulation in place. For the system pressure test associated with plant start up, the system shall be held at nominal operating pressure for at least 4 hours for insulated systems and 10 minutes for noninsulated systems before performing the VT-2 visual examination."

2.22.5 Staff Evaluation:

The Code requires the removal of all insulation from pressure-retaining bolted connections in systems borated for the purpose of controlling reactivity when performing VT-2 visual examinations during system pressure tests. As an alternative, the licensee has proposed a

two-step process, which requires a VT-2 visual examination with insulation removed at the bolted connections with zero or static pressure, which will enable the licensee to detect any boric acid residue from previous operation, and subsequently a second VT-2 visual examination during the system pressure test following a 4-hour hold at operating pressure with insulation in place and a 10-minute hold for noninsulated systems. The 4-hour hold allows time for leakage to penetrate the insulation, providing a means of detecting any significant leakage with the insulation in place. Both of these examinations are required once during each refueling outage. Since the Code-required examination would be conducted while the containment is at subatmospheric conditions, the staff considers that the requirement would result in a hardship without a compensating increase in the level of quality and safety. Further, the licensee's two-step VT-2 examination will provide reasonable assurance of detecting leakage of borated water at bolted connections. Therefore, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the third 10-year ISI interval.

2.23 Relief Request CS-1, Visual Examination and Repair/Replacements of Snubbers

2.23.1 Code Requirement:

The 1989 Edition of ASME Code Section XI, IWF-5000 requires that the first addenda to ASME/ANSI OM-1987, Part 4 (published in 1988) be used.

2.23.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee requests relief from fully performing the Code-required examination of Class 1, 2, and 3 snubbers.

2.23.3 Licensee's Basis for Relief (as stated):

"Differences exist between the referenced standard requirements and the North Anna Technical Specification 4.7.10. The first addenda to ASME/ANSI OM-1987, Part 4 (published in 1988) contains requirements, which were removed from technical specifications by Generic Letter 90-09, "Alternative Requirements for Snubber Visual Inspection Intervals and Corrective Actions." This document was issued on December 11, 1990 to reduce the burden placed upon utilities by the then excessively restrictive inspection schedule contained in technical specifications. The referenced standard in ASME Section XI again requires this excessively restrictive inspection schedule for snubbers. Later Code, ASME OMc Code-1994 Addenda to ASME OM-1990 Edition, subsection ISTD (replacing OM Part 4), Table ISTD 6.5.2-1, now contains the newer visual examination schedule similar to that in the North Anna Technical Specification 4.7.10. Therefore, requiring the use of the referenced standard's inspection schedule is considered to impose a burden without a compensating increase in quality and safety.

"The referenced standard additionally contains requirements eliminated by the later ISTD Code (1994 addenda) with regard to visual failure evaluation groupings. As this is not perceived by the industry as a significant technical issue, performance of this requirement would be an unnecessary administrative burden, and therefore impractical to perform.

"The remaining aspects of the referenced standard contain requirements, which are essentially the same as those already delineated in the North Anna Technical Specification 4.7.10, and the

ASME Section XI Repair/Replacement program. Requiring the use of the referenced standard in these remaining areas is an unnecessary [burden].

"This Relief Request has been previously submitted and approved for Surry Power Station Unit's 1 & 2, reference NRC Letter No. 95-303, Dated 6/8/95."

2.22.4 Licensee's Proposed Alternative (as stated):

"In lieu of the Code requirements specified in IWF-5000 for snubber visual examination, the requirements of North Anna Technical Specification 4.7.10 with regard to snubber visual examination shall be followed. The required examination shall be performed by personnel certified visual (VT-3) as required by the Code. Repairs and replacements shall be performed as required by the general requirements (IWA-4000 and IWA-7000) of ASME Section XI."

2.22.5 Staff Evaluation:

The NRC staff has reviewed the licensee's proposed Request for Relief from certain aspects of visual examination of Class 1, 2, and 3 snubbers. The staff finds that the visual examination requirements in the current North Anna Technical Specification 4.7.10 provide an acceptable level of quality and safety. Further, ASME OMc Code-1994 Addenda to ASME OM-1990 Edition, subsection ISTD, Table ISTD 6.5.2-1, along with the remaining aspects of OM-1990 and the ASME Section XI Repair/Replacement Program, contain requirements similar to the Technical Specification. Therefore, the proposed alternatives provide an acceptable level of quality and safety. The licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the third 10-year ISI interval.

Principal Contributors: S. Hou
P. Patnaik

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