VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

April 26, 2001

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No.	01-234
NL&OS/ETS R0	
Docket Nos.	50-338
	50-339
License Nos.	NPF-4
	NPF-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
RISK-INFORMED INSERVICE INSPECTION PROGRAM

In a letter dated May 10, 1999 the NRC approved a two-year delay in submitting the North Anna Unit 1 Class 1 piping ASME Section XI Inservice Inspection (ISI) program (NDE, Categories B-F and B-J) for the third inspection interval until April 30, 2001. This delay was necessary to permit the development of a Risk-Informed Inservice Inspection (RI-ISI) Program for Class 1 piping. Additionally, in a telephone conference call on September 21, 2000 with the NRC staff (Messrs. Edison, Sullivan, Ali, Dinsmore, Hou, and Harrison) the staff agreed that a common RI-ISI program for both North Anna Units could be submitted due to similar Class 1 piping configurations. Also, specific plant differences would be detailed in the submittal. As such, the proposed common (Units 1 & 2) RI-ISI Program is provided herein as an alternative to the current ASME Section XI Inservice Inspection requirements for Class 1 piping.

The RI-ISI Program has been developed in accordance with the Westinghouse Owners Group Topical Report WCAP-14572, Revision 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report." The attached document supports the conclusion that the proposed alternative provides an acceptable level of quality and safety as required by 10 CFR 50.55a(a)(3)(i). This program submittal, including a relief request, has been reviewed and approved by the Station Nuclear Safety and Operating Committee. Additional supporting documentation is available at our offices for NRC review. Similar RI-ISI Programs for piping have been previously approved by the NRC for Surry Unit 1 on December 16, 1998 and Surry Unit 2 on January 26, 2001.

Therefore, pursuant to 10 CFR 50.55a(a)(3)(i) and (ii), the proposed RI-ISI Program and associated relief request attached are provided for your review and approval as an alternative to current ASME Section XI inspection requirements for Class 1 piping. As noted above, North Anna Unit 1 has delayed their ISI program (Category B-J and B-F)

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two years to allow development of the RI-ISI program. However, only one refueling outage remains in the first period of the third interval. This refueling outage is scheduled for late summer 2001. In order to meet our ISI examination requirements for the first period and avoid potential Code compliance issues, we request review and approval of the RI-ISI Program by September 1, 2001. North Anna Unit 2 third interval starts on December 14, 2001. The first third interval Unit 2 refueling outage is scheduled for fall 2002.

We consider implementation of the RI-ISI Program to be a Cost Beneficial Licensing Action.

If you have any questions or require additional information, please contact us.

Very truly yours,

Leslie N. Hartz
Vice President - Nuclear Engineering and Services

Commitments made in this letter:

1. None

cc: U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Suite 23T85
Atlanta, Georgia 30303

Mr. M. J. Morgan
NRC Senior Resident Inspector
North Anna Power Station

Mr. J. E. Reasor, Jr.
Old Dominion Electric Cooperative
Innsbrook Corporate Center
4201 Dominion Blvd.
Suite 300
Glen Allen, Virginia 23060

NORTH ANNA POWER STATION UNITS 1 AND 2

RISK-INFORMED INSERVICE INSPECTION (RI-ISI) PROGRAM FOR ASME CLASS 1 PIPING

April 2001

RISK-INFORMED INSERVICE INSPECTION PROGRAM PLAN

Table of Contents

1. INTRODUCTION/RELATION TO NRC REGULATORY GUIDE 1.174

Introduction

Inservice inspections (ISI) are currently performed on piping to the requirements of the ASME Boiler and Pressure Vessel Code Section XI as required by 10CFR50.55a. The North Anna units will apply Risk-Informed ISI (RI-ISI) for the third inspection interval as defined by the Code for Program B. North Anna Unit 1 is currently using the 1989 Edition and North Anna Unit 2 will be using the 1995 Edition through 1996 Addenda of ASME Section XI.

The objective of this submittal is to request a change to the ISI program plan for Class 1 piping through the use of a Risk-Informed ISI Program. The risk-informed process used in this submittal is described in Westinghouse Owners Group WCAP-14572, Revision 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report," and WCAP-14572, Revision 1-NP-A, Supplement 1, "Westinghouse Structural Reliability and Risk Assessment (SRRA) Model for Piping Risk-Informed Inservice Inspection."

As a risk-informed application, this submittal meets the intent and principles of Regulatory Guide 1.174. Further information is provided in Section 3.10 relative to defense-in-depth.

The RI-ISI submittal is unit specific up to and including Section 3.7. The results obtained in the final safety classification of segments, as well as the similar Class 1 piping configurations, supported completion of the analysis using data from only one unit. Unit 2 was used as a typical representation. The results of the RI-ISI program will be applied to each unit separately on each unit's similarly numbered high safety-significant (HSS) piping segments.

PRA Quality

Version N7B, dated March 1998, of the plant-specific Level 1 and Level 2 probabilistic risk assessment (PRA) model, (CDF and LERF based on 3 year average equipment unavailability due to testing and maintenance), was used to evaluate the consequences of pipe ruptures during operation in Modes 1 and 2. The base core damage frequency (CDF) and base large early release frequency (LERF) from this version of the PRA model are 3.50E-05/yr and 4.66E-06/yr, respectively.

PRA model updates are scheduled at 18-month intervals to coincide with the refueling outages. Guidance for PRA updates is contained in our administrative procedures.

The RI-ISI evaluation included a determination that the PRA model and supporting documentation accurately reflect the current plant configuration and operational practices consistent with its intended application. An evaluation, based on Appendix B of the EPRI PSA Applications Guide, was performed as part of the Surry Unit 1 RI-ISI Pilot Program to confirm that the PRA conforms to the industry state-of-the-art with respect to completeness of coverage of potential scenarios. The PRA model has been extensively reviewed including peer reviews during the IPE process and internal reviews during the PRA model updates. The PRA model for North Anna, N7B, was created under the same standards as the Surry's PRA model (S7B). Since the S7B model has been certified using the Westinghouse Owner's Group (WOG) peer review certification process, the quality of N7B is considered to be at the same level as S7B.

2. PROPOSED ALTERNATIVE TO ISI PROGRAM

2.1 ASME Section XI

ASME Section XI Categories B-F and B-J currently contain the requirements for examining (using NDE) ASME Class 1 piping components. The alternative RI-ISI Program for piping is described in WCAP-14572, Revision 1-NP-A. The RI-ISI Program will be substituted for the current examination program on Class 1 piping in accordance with 10 CFR 50.55a(a)(3)(i). As an alternative, this program will provide an acceptable level of quality and safety. The program will be limited to ASME Class 1 piping only. Examination requirements as specified in non-related portions of the ASME Section XI Code, will remain unaffected by this program. WCAP-14572, Revision 1-NP-A, provides the requirements defining the relationship between the risk-informed examination program and the remaining unaffected portions of ASME Section XI.

2.2 Augmented Programs

The augmented inspection programs remain unchanged.

3. RISK-INFORMED ISI PROCESSES

The processes used to develop the RI-ISI Program are consistent with the methodology described in WCAP-14572, Revision 1-NP-A.

The process that applied involves the following steps:

- Scope Definition
- Segment Definition
- Consequence Evaluation
- Failure Assessment

- Risk Evaluation
- Expert Panel Categorization
- Element/NDE Selection
- Implement Program
- Feedback Loop

Relief request R-1 for NAPS Unit 1 (Appendix A) and relief request R-1 for NAPS Unit 2 (Appendix B) are submitted as deviations to WCAP-14572, Revision 1-NP-A.

3.1 Scope of Program

The ASME Class 1 systems in North Anna Units 1 and 2, which are included in the RI-ISI program, are provided in Table 3.1-1.

3.2 Segment Definitions

Once the systems to be included in the program are determined, the piping for these systems is divided into segments. Segment definitions were independently generated for North Anna Units 1 and 2.

The number of pipe segments defined for the five ASME Class 1 systems of Units 1 and 2 are summarized in Table 3.1-1. The North Anna Power Station ISI Classification Boundary drawings and Inservice Inspection Isometric drawings were used to define the segments. The Class 1 boundary is identified by the Q1 designation in the component line numbers or as indicated on the classification drawings.

When segment definitions of North Anna Unit 1 was compared to Unit 2, it was noted that the units are virtually identical, except for the minor differences as follows:

- Segment ECC-014 (Unit 1 only): Capped 2" diameter line off of Segment ECC-001 (cold leg safety injection line to loop 1).
- Segment RC-065 (Unit 1 only): ¾" line from loop 3 hot leg to reactor vessel level indication system.
- Segment RC-117 (Unit 2 only): ¾" line from loop 2 hot leg to reactor vessel level indication system.
- Segments RC-105 and 106 (Unit 1 only): ¾" drain line from hot leg safety injection line.
- Segments RH-004, 005, 006, and 007 (Unit 2 only): Leak monitor connections for RHR system MOVs.

3.3 Consequence Evaluation

The consequences of pressure boundary failures are measured in terms of core damage and large early release. The impact on these measures due to both direct and indirect effects was considered by using the North Anna PRA model N7B.

3.4 Failure Assessment

Failure estimates for North Anna Units 1 and 2 were independently generated utilizing industry failure history, plant specific failure history and other relevant information. The engineering team that performed this evaluation used the Westinghouse structural reliability and risk assessment (SRRA) software program (described in WCAP-14572, Revision 1-NP-A, Supplement 1) to aid in the process.

Table 3.4-1 summarizes the failure probability estimates by failure mechanism for North Anna Unit 2 and also identifies the systems susceptible to these mechanisms. North Anna Unit 2 is considered as typical for both units since Units 1 and 2 have similar Class 1 piping configuration. The only difference noted in the failure assessment between North Anna Units 1 and 2 were the snubber placement configurations. The failure probability assessment specifically addressed the effect of snubber failures. Although each unit's snubber placements are different, this difference is considered minor. This was confirmed by the final segment ranking, which was unaffected by the differences in snubber placement between the units.

Another consideration was whether a segment is included in the plant high-energy line break (HELB) augmented program. This information was used to determine which failure probability was used in the risk-informed ISI process. The failure probabilities used in the risk-informed process are documented and maintained in the plant records.

3.5 Risk Evaluation

Each piping segment within the scope of the North Anna Units 1 and 2 program was evaluated to determine its core damage frequency (CDF) and large, early release frequency (LERF) due to the postulated piping failure. Calculations were also performed with and without operator action.

Once this evaluation was completed, the total pressure boundary core damage frequency and large early release frequency were calculated by summing across the segments for each system. These calculations were performed independently for North Anna Units 1 and 2. The results of these calculations are presented in Table 3.5-1.

To assess safety significance, the risk reduction worth (RRW) and risk achievement worth (RAW) for each piping segment of Units 1 and 2 were independently calculated.

The RRW and RAW of each corresponding segments of Units 1 and 2 were then compared and the worst cases were selected to represent both units. These worst case RRW and RAW values were entered into the Expert Panel Worksheets.

3.6 Expert Panel Categorization

The final safety determination (i.e., high and low safety significance) of each piping segment was made by the expert panel using both probabilistic and deterministic insights. The expert panel was comprised of personnel who have expertise in the following fields: probabilistic safety assessment, inservice examination, nondestructive examination, stress and material considerations, plant operations, plant and industry maintenance, repair, and failure history, system design and operation, and SRRA methods including uncertainty. Members associated with the Maintenance Rule were used to ensure consistency with the other PRA applications.

The following lead personnel (i.e., permanent members) were in attendance during all expert panel meetings:

- Probabilistic Risk Assessment (PRA engineer)
- Operations (SRO or STA – current or previously qualified)
- Inservice Inspection (ISI)
- Plant & Industry Maintenance, Repair, and Failure History (System Engineer)

A minimum of four members filling the above positions constituted a quorum for an expert panel meeting. This core team of panel members was supplemented by other experts, including a metallurgist and piping stress engineer, as required for the piping system under evaluation.

The expert panel chairperson was appointed by the Manager - Nuclear Engineering. The chairperson conducted and ruled on the proceedings of the meeting.

Members received training and indoctrination in the RI-ISI selection process. They were indoctrinated in the application of risk analysis techniques for ISI. These techniques included risk importance measures, threshold values, failure probability models, failure mode assessments, PRA modeling limitations and the appropriate use of expert judgment. Training documentation is maintained with the expert panel's records.

Worksheets were provided to the panel on each system for each piping segment containing information typical to both units, which were pertinent to the panel's selection process. In addition to the Expert Panel Worksheets, all other independently generated information for North Anna Units 1 and 2 was available to the expert panel members. This information, in conjunction with each panel member's own expertise and other documents as appropriate, was used to determine the safety significance of each piping segment.

A consensus process was used by the expert panel. Consensus was defined as unanimous agreement during first consideration and at least 2/3 agreement of members or alternates present in the second or subsequent considerations.

The chairperson appointed an individual to record the minutes of the meeting. The minutes included 1) the names of members and alternates in attendance, 2) whether a quorum was present, 3) relevant discussion summaries and 4) the results of membership voting. The minutes are available as program records.

3.7 Identification of High Safety-Significant Segments

The number of high safety-significant segments for each system, as determined by the expert panel, is shown in Table 5-1.

3.8 Structural Element and NDE Selection

The structural elements in the high safety-significant piping segments were selected for inspection, with appropriate non-destructive examination (NDE) methods specified.

The initial RI-ISI program addresses the high safety-significant (HSS) piping components placed in Regions 1 and 2 of Figure 3.7-1 in WCAP-14572, Revision 1-NP-A. Region 3 piping components, which are low safety significant, are to be considered in an Owner Defined Program and are not considered part of the program requiring approval. Regions 1, 2, 3 and 4 piping components will continue to receive Code required pressure testing, as part of the current ASME Section XI Program. Based on the North Anna Unit 2 data, for the 225 piping segments that were evaluated in the RI-ISI Program, Region 1 contains 26 segments, Region 2 contains 64 segments, Region 3 contains 19 segments, and Region 4 contains 116 segments.

The number of locations to be inspected in a HSS segment was determined using the Westinghouse statistical (Perdue) model as described in Section 3.7 of WCAP-14572, Revision 1-NP-A. One of the HSS piping segments in Region 1 and 46 of the HSS piping segments in Region 2 were evaluated using the Perdue model. Segments with socket welds or with vibration fatigue postulated as the failure mechanism will be examined with the VT-2 method (See Appendices A and B, Relief Request R-1 for NAPS Units 1 and 2, respectively).

Table 4.1-1 in WCAP-14752, Revision 1-NP-A, was used as guidance in determining the examination requirements for the HSS piping segments. VT-2 visual examinations are scheduled in accordance with the station's pressure test program, which remains unaffected by the risk-informed inspection program.

Additional Examinations

Additional examinations will be performed in accordance with WCAP-14572, Revision 1-NP-A.

3.9 Program Relief Requests

Relief request R-1 for NAPS Unit 1 (Appendix A) and relief request R-1 for NAPS Unit 2 (Appendix B) are submitted for NRC approval. The other separately submitted 10-year ISI programmatic relief requests are not affected.

3.10 Change in Risk

Development of the RI-ISI program has been in accordance with Regulatory Guide 1.174, and the effect on plant risk associated with implementation of this program is expected to slightly decrease when compared to that associated with current ISI requirements.

A comparison between the proposed RI-ISI Program and the current ASME Section XI ISI Program was made on Unit 2 (typical) to evaluate the change in risk. The approach evaluated the change in risk with the inclusion of the probability of detection as determined by the SRRA model.

The results from the risk comparison are shown in Table 3.10-1. As seen from the table, the proposed RI-ISI Program reduces the CDF/LERF risk associated with piping slightly when compared to the current ASME Section XI Program while reducing the number of examinations.

Defense-In-Depth

The program requires 43, 4" and greater nominal pipe size (NPS) welds to be volumetrically (UT) examined. The program requires 8, less than 4" NPS welds to be volumetrically (UT) examined. Five additional welds are included in the program for defense in depth, which will be volumetrically (UT) examined. These five welds are greater than 4" NPS welds and are located on the RCS safety injection lines or the pressurizer surge line. A total of 56 volumetric (UT) examinations will be performed on each unit each interval. A breakdown of the Section XI requirements has been performed for each weld on Unit 2 (Unit 1 would be very similar) for comparison to the proposed RI-ISI program.

This breakdown of the AMSE Section XI Program is as follows:

B-F welds - 18

B-J	
B9.11 welds -	548
B9.21 welds -	656
B9.31 welds -	13
B9.32 welds -	31
B9.40 welds -	1010

Examinations of longitudinal welds are performed in conjunction with selected circumferential welds and are not individually scheduled in the existing ASME XI program.

4. IMPLEMENTATION AND MONITORING PROGRAM

Upon approval of the RI-ISI Program, procedures that comply with the guidelines described in WCAP-14572, Revision 1-NP-A, will be prepared to implement and monitor the program. The new program will be integrated into the existing ASME Section XI interval for North Anna Unit 1 (Interval 3) and with the start of the third interval for North Anna Unit 2. (Reference previous letter regarding implementation of the North Anna Unit 1 RI-ISI Program, dated December 22, 1998 and approved by NRC letter dated May 10, 1999).

The applicable aspects of the Code not affected by the proposed alternative RI-ISI program will be retained, such as inspection methods, acceptance guidelines, pressure testing, corrective measures, documentation requirements, and quality control requirements. Existing ASME Section XI Program implementing procedures will be retained and modified to address the RI-ISI process, as appropriate.

The proposed monitoring and corrective action program will contain the following elements:

A. Identification
B. Characterization
C. Evaluation
   (1) Determination of cause and extent of the condition identified
   (2) Development of corrective action plan(s)
D. Decision
E. Implementation
F. Monitoring
G. Trending

The RI-ISI Program is a living program requiring relevant feedback to ensure the appropriate identification of high safety-significant piping locations. As a minimum, risk ranking of piping segments will be reviewed and adjusted on an ASME period basis. Significant changes may require more frequent adjustment as directed by applicable NRC bulletin, Generic Letter requirements, or plant specific feedback.

5. PROPOSED ISI PROGRAM PLAN CHANGE

A comparison between the RI-ISI Program and the current ASME Section XI Program requirements for piping is given in Table 5-1. An identification of piping segments that are part of plant augmented programs is also included in Table 5-1.

6. REFERENCES/DOCUMENTATION

- WCAP-14572, Revision 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report," February 1999

- WCAP-14572, Revision 1-NP-A, Supplement 1, "Westinghouse Structural Reliability and Risk Assessment (SRRA) Model for Piping Risk-Informed Inservice inspection," February 1999

Supporting Onsite Documentation

- Calculation No. SM-1285, Rev. 0, "Segment Definitions for North Anna Units 1 and 2 RI-ISI Programs"

- Calculation No. SM-1286, Rev. 0, "Risk-Informed Inservice Inspection Program - Quantification of Core Damage Frequency (CDF), NAPS U1&2"

- Calculation No. SM-1287, Rev. 0, "Risk-Informed Inservice Inspection Program - Indirect Effects Analysis, NAPS U1&2"

- Calculation No. SM-1288, Rev. 0, "Risk-Informed Inservice Inspection Program - Quantification of Large Early Release Frequency (LERF), NAPS U1&2"

- ET ISI 01-0001, Rev. 0, "RI-ISI Failure Probabilities, North Anna Power Station Units 1 and 2 "

- Calculation No. SM-1299, Rev. 0, "North Anna Units 1 and 2 Risk-Informed Inservice Inspection – Risk Evaluation"

REFERENCES (continued)

- Calculation No. SM-1300, Rev. 0, "MS Access Database for the Risk Informed Inservice Inspection (RI-ISI) Program, NAPS U1&2"

- ET ISI 01-0002, Rev. 0, "RI-ISI Miscellaneous Documentation, North Anna Power Station Units 1 and 2"

- Calculation No. SM-1303, Rev. 0, "Change in Risk Calculations for North Anna Units 1 and 2 Risk-Informed Inservice Inspection"

- Calculation No. SM-1304, Rev. 0, "NAPS RI-ISI Units 1 and 2 Perdue Model Calculation"

Table 3.1-1 ASME Class 1 System Selection and Segment Definition				
System Description	PRA	Section XI	Number of Segments	
			Unit 1	Unit 2
ACC (SI) – Accumulator	Yes	Yes	9	9
CH - Chemical & Volume Control	Yes	Yes	43	43
ECC (SI) – Emergency Core Cooling	Yes	Yes	50	49
RC - Reactor Coolant	Yes	Yes	119	117
RH - Residual Heat Removal	Yes	Yes	3	7
Total			224	225

Table 3.4-1 Failure Probability Estimates (without ISI) NAPS 2 (typical)		
Failure Mechanism	Failure Probability Range (Small Leak probability @40 years, no ISI)	Susceptible Systems
Fatigue (Default, e.g., no mechanism, snubber locking up in thermal conditions)	9E-08 - 7E-04	ACC,CH,ECC,RC,RH
Striping/Stratification	7E-05 - 9E-05	RC
Vibratory Fatigue	2E-05 - 6E-03	CH,RC

Table 3.5-1
Number of Segments and Piping Risk Contribution by System (without ISI)
(Values shown are expected means)

	System	Number of Segments	CDF without Operator Action (/yr)	CDF with Operator Action (/yr)	LERF without Operator Action (/yr)	LERF with Operator Action (/yr)
Unit 1	ACC	9	1.85E-11	1.88E-11	2.15E-11	8.42E-13
	CH	43	2.48E-06	2.48E-06	7.69E-08	7.62E-08
	ECC	50	8.13E-06	9.04E-07	1.40E-06	1.42E-07
	RC	119	8.40E-06	8.40E-06	1.69E-07	1.69E-07
	RH	3	5.45E-10	5.45E-10	1.85E-09	1.85E-09
	TOTAL	224	1.90E-05	1.18E-05	1.64E-06	3.89E-07
Unit 2	ACC	9	5.62E-11	5.68E-11	6.50E-11	2.55E-12
	CH	43	2.48E-06	2.48E-06	7.69E-08	7.62E-08
	ECC	49	8.66E-06	1.05E-06	1.46E-06	1.48E-07
	RC	117	8.08E-06	8.08E-06	1.66E-07	1.66E-07
	RH	7	5.90E-09	5.90E-09	2.01E-08	2.01E-08
	TOTAL	225	1.92E-05	1.16E-05	1.73E-06	4.09E-07

Table 3.10-1 COMPARISON OF CDF/LERF FOR CURRENT SECTION XI AND RISK-INFORMED ISI PROGRAMS RC SYSTEM WAS THE DOMINANT CONTRIBUTOR TO THE CHANGE		
Case (Systems Contributing to Change)	Piping CDF/LERF Current Section XI	Piping CDF/LERF Risk-Informed
CDF No Operator Action	1.15E-05	6.48E-06
CDF with Operator Action	6.23E-06	5.69E-06
LERF No Operator Action	1.16E-06	3.09E-07
LERF with Operator Action	2.55E-07	1.77E-07

North Anna Unit 2 (typical) Structural Element Selection Results and Comparison to ASME Section XI 1986 Edition Requirements

Table 5-1

System	Number of High Safety-Significant Segments (No. in Augmented Program)	RI-ISI Program High Safety-Significant Structural Elements (Class 1 only)	ASME Section XI ISI Program 1986 Edition Examination Category Weld Selections (Interval 2)		Total Number of Segments Credited in Augmented Programs
			B-F	B-J or C-F-1[e]	
ACC	0	0	0	11	0
CH	12	6[a] + 6[b]	0	106	0
ECC	21	10[b] + 12[c]	0	102	0
RC	54(3)	19[a] + 1[b] + 43[c]	18	181	3
RH	3[d]	2[b] + 1[c]	0	5	0
TOTAL	90(3)	25[a] + 19[b] + 56[c]	18	405	3

Notes

a) VT-2 examination of segment due to failure mechanism postulated as vibration fatigue.

b) Scheduled VT-2 examination of segment socket welds (Relief Requested).

c) Scheduled volumetric examinations.

d) Two HSS segments on Unit 2 RH (drains) do not exist on Unit 1.

e) Comparison is with Interval 2 ASME Section XI program. Some piping segments were Class 2 in Interval 2 and have been reclassified Class 1 for Interval 3.

APPENDIX A

Relief Request R-1
For NAPS Unit 1

I. Identification of Components

ASME Class 1 socket weld connections identified as being High Safety-Significant (HSS).

II. Impractical Code Requirements

Code Case N-577, Table 1 Examination Category R-A and WCAP-14572, Rev. 1-NP-A, Table 4.1-1, both require examination of HSS components based upon the postulated failure mechanism for the element of piping being examined. The requirement does not account for the geometric limitations imposed by socket welds when volumetric examinations are specified. Therefore, the current requirement is considered impractical.

III. Basis for Relief

Certain socket weld connections for North Anna Unit 1 have been identified as HSS and require volumetric examination for their postulated failure mechanism. These instances are associated with a potential thermal fatigue damage mechanism either caused by a snubber malfunction or as a default mechanism for segments selected for their consequence of failure with no assumed active mechanism occurring. Performing a volumetric examination on a socket weld connection provides little or no benefit, being limited by the joint configuration and the smaller pipe size.

The ASME Code Committee recognized this problem and revised Code Case N-577 to allow substitution of the VT-2 examination method for all damage mechanisms on socket weld connections selected as HSS. The revised version is noted as Code Case N-577-1 and provides for the substitution in note 12 of Table 1 in the revised Code Case.

Performing a VT-2 examination on the identified HSS location, where volumetric examination is specified, is the most reasonable alternative. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii) performing a volumetric examination on socket weld connections would result in unusual difficulty without providing any meaningful results, and thus no compensating increase in the level of quality and safety. Substituting a VT-2 examination as an alternative each refueling outage for these locations ensures reasonable assurance of component integrity.

IV. Alternate Provisions

A VT-2 exam will be performed on the subject socket welds each refueling outage in conjunction with the system pressure test. These alternate requirements have been approved previously for Surry Unit 2 by NRC letter dated January 26, 2001.

APPENDIX B

Relief Request R-1
For NAPS Unit 2

I. Identification of Components

ASME Class 1 socket weld connections identified as being High Safety-Significant (HSS).

II. Impractical Code Requirements

Code Case N-577, Table 1 Examination Category R-A and WCAP-14572, Rev. 1-NP-A, Table 4.1-1, both require examination of HSS components based upon the postulated failure mechanism for the element of piping being examined. The requirement does not account for the geometric limitations imposed by socket welds when volumetric examinations are specified. Therefore, the current requirement is considered impractical.

III. Basis for Relief

Certain socket weld connections for North Anna Unit 2 have been identified as HSS and require volumetric examination for their postulated failure mechanism. These instances are associated with a potential thermal fatigue damage mechanism either caused by a snubber malfunction or as a default mechanism for segments selected for their consequence of failure with no assumed active mechanism occurring. Performing a volumetric examination on a socket weld connection provides little or no benefit, being limited by the joint configuration and the smaller pipe size.

The ASME Code Committee recognized this problem and revised Code Case N-577 to allow substitution of the VT-2 examination method for all damage mechanisms on socket weld connections selected as HSS. The revised version is noted as Code Case N-577-1 and provides for the substitution in note 12 of Table 1 in the revised Code Case.

Performing a VT-2 examination on the identified HSS location, where volumetric examination is specified, is the most reasonable alternative. Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii) performing a volumetric examination on socket weld connections would result in unusual difficulty without providing any meaningful results, and thus no compensating increase in the level of quality and safety. Substituting a VT-2 examination as an alternative each refueling outage for these locations ensures reasonable assurance of component integrity.

IV. Alternate Provisions

A VT-2 exam will be performed on the subject socket welds each refueling outage in conjunction with the system pressure test. These alternate requirements have been approved previously for Surry Unit 2 by NRC letter dated January 26, 2001.