



Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402-2801

January 15, 2010

10 CFR 50.4  
10 CFR 50.55a

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555-0001

Browns Ferry Nuclear Plant, Units 1, 2, and 3  
Facility Operating License Nos. DPR-33, DPR-52, and DPR-68  
NRC Docket Nos. 50-259, 50-260, and 50-296

Subject: **American Society of Mechanical Engineers, Section XI Inservice Inspection Program for the Unit 1 Second Ten-Year Inspection Interval and the Units 2 and 3 Third Ten-Year Inspection Interval, Request for Relief ISI-23**

In accordance with 10 CFR 50.55a(a)(3)(i), the Tennessee Valley Authority (TVA) is requesting relief from certain inservice inspection (ISI) requirements in Section XI of the American Society of Mechanical Engineers (ASME) Code, for the volumetric examination of Class 1, reactor pressure vessel (RPV) nozzle-to-vessel welds and nozzle inner radius sections for Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3. An alternative to the Section XI requirements is requested for the BFN Unit 1 Second Ten-Year Inspection Interval and the BFN Units 2 and 3 Third Ten-Year Inspection Interval. The enclosure to this letter contains BFN Units 1, 2, and 3 request for relief ISI-23, for NRC review and approval.

TVA proposes to use ASME Code Case N-702, "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds," in lieu of the examination requirements of ASME Section XI, Table IWB-2500-1, "Examination Categories," to allow reduced percentage requirements for Nozzle-to-Vessel Weld and Inner Radius Section examinations.

The technical basis for ASME Code Case N-702 is documented in the Electric Power Research Institute (EPRI) Technical Report 1003557, dated October 2002, for the Boiling Water Reactor Vessel and Internals Project (BWRVIP), "BWRVIP-108, BWR Vessel and

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Internals Project, Technical Basis for the Reduction of Inspection Requirements for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Inner Radius," which was approved by the NRC in a Safety Evaluation Report dated December 19, 2007 (ML073600374).

This request for relief is consistent with a request for relief submitted for the Duane Arnold Energy Center by letter dated February 28, 2008. This request was approved by NRC as documented in a safety evaluation dated August 28, 2008.

TVA requests approval of this request for relief by September 2, 2010 to support the BFN Unit 1 fall refueling outage.

There are no new regulatory commitments in this letter. If you have any questions, please contact Dan Green at (423) 751-8423.

Respectfully,

A handwritten signature in black ink, appearing to read 'R. M. Krich', is written over a faint, circular official stamp.

R. M. Krich  
Vice President  
Nuclear Licensing

Enclosure: Browns Ferry Nuclear Plant, Units 1, 2, and 3, Request for Relief ISI-23

cc (Enclosure):

NRC Regional Administrator - Region II  
NRC Senior Resident Inspector - Browns Ferry Nuclear Plant

**Enclosure**

**Tennessee Valley Authority  
Browns Ferry Nuclear Plant  
Units 1, 2, and 3**

**American Society of Mechanical Engineers,  
Section XI Inservice Inspection Program,  
Unit 1 Second Ten-Year Inspection Interval and  
Units 2 and 3 Third Ten-Year Inspection Interval**

**Request for Relief ISI-23**

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**Executive Summary:** In accordance with 10 CFR 50.55a(a)(3)(i), the Tennessee Valley Authority (TVA) is requesting relief from inservice inspection requirements of the 2001 Edition through 2003 Addenda of Section XI, Table IWB-2500-1, "Examination Category B-D, Full Penetration Welded Nozzles in Vessels-Inspection Program B," Item No. B3.90, "Reactor Vessel Nozzle to Vessel Welds," and Item No. B3.100, "Reactor Vessel Nozzle Inner Radius Section" of the ASME Boiler and Pressure Vessel Code (BFN Units 1 and 3) and from inservice inspection requirements of the 1995 Edition, 1996 Addenda of Section XI, Table IWB-2500-1 Examination Category B-D, "Full Penetration Welded Nozzles in Vessels-Inspection Program B", Item No. B3.90, "Reactor Vessel Nozzle to Vessel Welds," and Item No. B3.100, "Reactor Vessel Nozzle Inner Radius Section" of the ASME Boiler and Pressure Vessel Code (Unit 2).

As an alternative, TVA proposes to use ASME Code Case N-702, "Alternative Requirements for Boiling Water Reactor (BWR) Nozzle Inner Radius and Nozzle-to-Shell Welds," in lieu of the examination requirements of ASME Section XI, Table IWB-2500-1, "Examination Categories," to allow reduced percentage requirements for Nozzle-to-Vessel Weld and Inner Radius Section examinations.

**Unit:** Browns Ferry Nuclear Plant, Units 1, 2, and 3

**ASME Code Components Affected:** Reactor Pressure Vessel (RPV), Nozzle-to-Vessel Welds and RPV Nozzle Inner Radius Sections:

Reactor Recirculation Inlet Nozzles, N2A, N2B, N2C, N2D, N2E, N2F, N2G, N2H, N2J, and N2K

Main Steam Nozzles, N3A, N3B, N3C, and N3D

Core Spray Nozzles, N5A and N5B

Reactor Pressure Vessel (RPV) Head Nozzles, N6A, N6B, and N7

Jet Pump Instrumentation Nozzles, N8A and N8B

**ASME Code Class:** ASME Code Class 1

**Section XI Edition:** 2001 Edition, 2003 Addenda for BFN Units 1 and 3 and 1995 Edition, 1996 Addenda for BFN Unit 2. Additionally, for ultrasonic examinations, Section XI, Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," of the 2001 Edition (BFN Units 1 and 3) or 1995 Edition, 1996 Addenda (BFN Unit 2) is implemented as required and modified by 10 CFR 50.55a(b)(2)(xv).

**Code Table:** Table IWB-2500-1, "Examination Categories"

**Code Examination Category:** B-D, "Full Penetration Welded Nozzles in Vessels" – Inspection Program B

**Code Examination Item Number:** B3.90, "Nozzle-To-Vessel Welds" and B3.100, "Nozzle Inside Radius Section"

**Code Requirement:** The 2001 Edition, 2003 Addenda and 1995 Edition, 1996 Addenda, of ASME Section XI, Table IWB-2500-1, Examination Category B-D, Item No. B3.90 and Item No. B3.100, require a volumetric examination of 100 percent each ten-year inspection interval of the reactor pressure vessel (RPV) nozzle-to-shell welds and nozzle inner radius section.

**Reason for Request:** The RPV Nozzle-to-Vessel Shell Welds and RPV Nozzle Inner Radius Sections listed in Attachment A are scheduled to be examined prior to the end of the current inspection interval for Browns Ferry Nuclear Plant, Units 1, 2, and 3. The proposed alternative provides an acceptable level of quality and safety and the reduction in examination scope could provide a total reduction in personnel radiation exposure of as much as 17.9 Person-REM (see Attachment A) over the remainder of the current inspection interval for each of the BFN units.

**Proposed Alternative and Basis for Use:** Pursuant to 10 CFR 50.55a(a)(3)(i), TVA is requesting relief from performing the required examinations on 100 percent of the identified nozzles. As an alternative, TVA proposes to examine 25 percent of the nozzle-to-vessel welds and nozzle inner radius sections, except for the Recirculation Outlet welds, including at least one nozzle from each system and nominal pipe size in accordance with ASME Code Case N-702. For the nozzles identified in Attachment A, the number of components to be examined from each group is provided in Table 1 below. For BFN Units 2 and 3, TVA is taking credit for nozzle-to-vessel welds and inner radius section examinations previously completed during the current ten-year interval for each unit. This relief is not requested to be applied to the Recirculation Outlet Nozzle welds.

Table 1

## Number of Nozzles / Inner Radius to be Examined

System and Nozzle ID	Number of Nozzles	Number to be Examined	Comments
Reactor Recirculation Inlet (N2A, N2B, N2C, N2D, N2E, N2F, N2G, N2H, N2J, and N2K)	10	3	See Attachment C for history of previous examinations.
Main Steam (N3A, N3B, N3C, and N3D)	4	1	See Attachment C for history of previous examinations.
Core Spray (N5A and N5B)	2	1	See Attachment C for history of previous examinations.
Reactor Pressure Vessel (RPV) Head (N6A, N6B, and N7)	3	1	See Attachment C for history of previous examinations.
Jet Pump Instrumentation (N8A and N8B)	2	1	See Attachment C for history of previous examinations.

Code Case N-702 states that a VT-1 visual examination may be used in lieu of volumetric examination for the inner radii (Item B3.100). TVA is currently using Code Case N-648-1, Alternative Requirements for Inner Radius Examination of Class 1 Reactor Vessel Nozzles, Section XI Division 1, subject to the conditions provided in Regulatory Guide 1.147, Revision 15, dated October 2007.

**Basis For Relief:** Electric Power Research Institute (EPRI) Technical Report 1003557, dated October 2002, "BWRVIP-108: Boiling Water Reactor Vessel and Internals Project Technical Basis for the Reduction of Inspection Requirements for the Boiling Water Reactor Nozzle-to-Vessel Shell Welds and Nozzle Blend Radius," provides the basis for ASME Code Case N-702. EPRI Technical Report 1003557 found that failure probabilities at the nozzle blend radius region and nozzle-to-vessel shell weld due to a Low Temperature Overpressure event are very low (i.e.,  $<1 \times 10^{-6}$  for 40 years) with or without inservice inspection. The report concludes that inspection of 25 percent of each nozzle type is technically justified.

The NRC documented their review of the EPRI report in an NRC Safety Evaluation Report (SER) dated December 19, 2007. In Section 5.0, "Plant Specific Applicability," of the SER, the NRC stated that each licensee who plans to request relief from the ASME Code, Section XI requirements for RPV nozzle-to-vessel shell welds and nozzle inner radius sections may reference the BWRVIP-108 report as the technical basis for the use of ASME Code Case N-702 as an alternative. However, each licensee should demonstrate the plant-specific applicability for the BWRVIP-108 report to each unit in the relief request by showing that all the general and nozzle-specific criteria addressed below are satisfied (See Attachment B):

- (1) The maximum Reactor Pressure Vessel (RPV) heatup/cooldown rate is limited to less than 115°F per hour. The BFN Units 1, 2, and 3 Technical Specifications (TS) Surveillance Requirement (SR) 3.4.9.1.b limits Reactor Coolant System (RCS) heatup and cooldown rates to  $\leq 100^\circ\text{F}$  in any 1 hour for pressure and temperature limits specified in TS Figure 3.4.9-1, "Pressure/Temperature Limits for Mechanical Heatup, Cooldown following Shutdown, and Reactor Critical Operations." For the pressure and temperature limits specified in TS Figure 3.4.9-2, "Pressure/Temperature Limits for In-Service Leak and Hydrostatic Testing," Note 2 to BFN Units 1, 2, and 3, TS SR 3.4.9.1 limits RCS heatup and cooldown rates to  $\leq 15^\circ\text{F/hr}$ . The TVA surveillance procedures that require monitoring of reactor vessel heatup/cooldown (Surveillance Procedure 1-, 2-, 3-SR-3.4.9.1(1) and 1-, 2-, 3-SR-3.4.9.1(2)) limit the heatup and cooldown rates to less than or equal to 100°F/hr for Browns Ferry TS Figure 3.4.9-1 pressure/temperature limits and less than or equal to 15°F/hr for TS Figure 3.4.9-2 pressure/temperature limits.

For the Recirculation Inlet Nozzles the following criteria must be met:

- (2)  $(pr/t)/C_{RPV} < 1.15$ , the calculation for BFN Recirculation Inlet (N2) Nozzles results in 1.0986 which is less than 1.15 which satisfies Criterion 2.
- (3)  $[p(r_o^2 + r_i^2)/(r_o^2 - r_i^2)]/C_{NOZZLE} < 1.15$ , the calculation for BFN N2 Nozzles results in 1.0012 which is less than 1.15 which satisfies Criterion 3.

For the Recirculation Outlet Nozzles the following criteria must be met:

- (4)  $(pr/t)/C_{RPV} < 1.15$ , the calculation for BFN Recirculation Outlet (N1) Nozzles results in 1.3134 which is higher than 1.15. Therefore, Criterion 4 is not satisfied for the BFN N1 nozzles. Therefore, these nozzles are not in the scope of this relief request.

- (5)  $[p(r_o^2 + r_i^2)/(r_o^2 - r_i^2)]/C_{\text{NOZZLE}} < 1.15$ , the calculation for the BFN N1 Nozzles results in 1.0751 which is less than 1.15 which satisfies Criterion 5.

Based upon the above information, all RPV nozzle-to-vessel shell welds and nozzle inner radii sections, with the exception of the Recirculation Outlet Nozzles, meet the BWRVIP-108 Report criteria and therefore Code Case N-702 is applicable. The Recirculation Outlet Nozzles do not meet all of the BWRVIP-108 Report criteria. Therefore, Code Case N-702 is not applicable to these nozzles. As such, this relief is not requested to be applied to the Recirculation Outlet Nozzles. See Attachment B for details.

Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), TVA considers that the use of Code Case N-702 provides an acceptable level of quality and safety for all RPV nozzle-to-vessel shell welds and nozzle inner radii sections for each BFN unit, with the exception of the Recirculation Outlet Nozzles (N1A and N1B).

**Implementation Schedule:**

This alternative is requested for the BFN Units 1, 2, and 3 current Ten-Year Inspection intervals as listed below:

Unit 1, Second Ten-Year Inspection interval (June 2, 2008 through June 1, 2017)

Unit 2, Third Ten-Year Inspection interval (May 25, 2001 through May 24, 2011)

Unit 3, Third Ten-Year Inspection interval (November 19, 2005 through November 18, 2015)

**Precedent:**

The NRC has approved a similar request for the Duane Arnold Energy Center. This approval is documented in an NRC safety evaluation dated August 28, 2008 (ML082040046).

Attachment A - Applicable Nozzles / Inner Radius for Unit 1							
RPV Nozzle	Component ID	Category	Item Number	Nozzle ID (NOM)	Comments/Dose Estimates		
					Man-hrs	Dose Rate (mR-hr)	Dose (Rem)
N2A	N2A-NV	B-D	B3.90	11.56"	8	85	0.680
	N2A-IR	B-D	B3.100	11.56"			
N2B	N2B-NV	B-D	B3.90	11.56"	8	85	0.680
	N2B-IR	B-D	B3.100	11.56"			
N2C	N2C-NV	B-D	B3.90	11.56"	8	85	0.680
	N2C-IR	B-D	B3.100	11.56"			
N2D	N2D-NV	B-D	B3.90	11.56"	8	85	0.680
	N2D-IR	B-D	B3.100	11.56"			
N2E	N2E-NV	B-D	B3.90	11.56"	8	85	0.680
	N2E-IR	B-D	B3.100	11.56"			
N2F	N2F-NV	B-D	B3.90	11.56"	8	85	0.680
	N2F-IR	B-D	B3.100	11.56"			
N2G	N2G-NV	B-D	B3.90	11.56"	8	85	0.680
	N2G-IR	B-D	B3.100	11.56"			
N2H	N2H-NV	B-D	B3.90	11.56"	8	85	0.680
	N2H-IR	B-D	B3.100	11.56"			
N2J	N2J-NV	B-D	B3.90	11.56"	8	85	0.680
	N2J-IR	B-D	B3.100	11.56"			
N2K	N2K-NV	B-D	B3.90	11.56"	8	85	0.680
	N2K-IR	B-D	B3.100	11.56"			
N3A	N3A-NV	B-D	B3.90	23.75"	10	60	0.600
	N3A-IR	B-D	B3.100	23.75"			



RPV Nozzle	Component ID	Category	Item Number	Nozzle ID (NOM)	Comments/Dose Estimates		
					Man-hrs	Dose Rate (mR-hr)	Dose (Rem)
N3B	N3B-NV	B-D	B3.90	23.75"	10	60	0.600
	N3B-IR	B-D	B3.100	23.75"			
N3C	N3C-NV	B-D	B3.90	23.75"	10	60	0.600
	N3C-IR	B-D	B3.100	23.75"			
N3D	N3D-NV	B-D	B3.90	23.75"	10	60	0.600
	N3D-IR	B-D	B3.100	23.75"			
N5A	N5A-NV	B-D	B3.90	8.78"	6	30	0.180
	N5A-IR	B-D	B3.100	8.78"			
N5B	N5B-NV	B-D	B3.90	8.78"	6	30	0.180
	N5B-IR	B-D	B3.100	8.78"			
N6A	N6A-NV	B-D	B3.90	6-7/32"	6	15	0.090
	N6A-IR	B-D	B3.100	6-7/32"			
N6B	N6B-NV	B-D	B3.90	6-7/32"	6	15	0.090
	N6B-IR	B-D	B3.100	6-7/32"			
N7	N7-NV	B-D	B3.90	4-1/4"	5	30	0.150
	N7-IR	B-D	B3.100	4-1/4"			
N8A	N8A-NV	B-D	B3.90	3-13/16"	5	40	0.200
	N8A-IR	B-D	B3.100	3-13/16"			
N8B	N8B-NV	B-D	B3.90	3-13/16"	5	40	0.200
	N8B-IR	B-D	B3.100	3-13/16"			
Total Dose Savings for Remainder of the 2nd Interval (Note 1)					7.18 Rem		

Note 1: Dose savings of 7.18 Rem is based on performance of the reduced number of components to be examined as shown in Table 1.

### Attachment A - Applicable Nozzles / Inner Radius for Unit 2

RPV Nozzle	Component ID	Category	Item Number	Nozzle ID (NOM)	Comments/Dose Estimates		
					Man-hrs	Dose Rate (mR-hr)	Dose (Rem)
N2A	N2A-NV	B-D	B3.90	11.56"	8	85	Note 2
	N2A-IR	B-D	B3.100	11.56"			
N2B	N2B-NV	B-D	B3.90	11.56"	8	85	Note 2
	N2B-IR	B-D	B3.100	11.56"			
N2C	N2C-NV	B-D	B3.90	11.56"	8	85	Note 2
	N2C-IR	B-D	B3.100	11.56"			
N2D	N2D-NV	B-D	B3.90	11.56"	8	85	0.680
	N2D-IR	B-D	B3.100	11.56"			
N2E	N2E-NV	B-D	B3.90	11.56"	8	85	0.680
	N2E-IR	B-D	B3.100	11.56"			
N2F	N2F-NV	B-D	B3.90	11.56"	8	85	Note 2
	N2F-IR	B-D	B3.100	11.56"			
N2G	N2G-NV	B-D	B3.90	11.56"	8	85	Note 2
	N2G-IR	B-D	B3.100	11.56"			
N2H	N2H-NV	B-D	B3.90	11.56"	8	85	Note 2
	N2H-IR	B-D	B3.100	11.56"			
N2J	N2J-NV	B-D	B3.90	11.56"	8	85	Note 2
	N2J-IR	B-D	B3.100	11.56"			
N2K	N2K-NV	B-D	B3.90	11.56"	8	85	0.680
	N2K-IR	B-D	B3.100	11.56"			
N3A	N3A-NV	B-D	B3.90	23.75	10	60	0.600
	N3A-IR	B-D	B3.100	23.75"			

RPV Nozzle	Component ID	Category	Item Number	Nozzle ID (NOM)	Comments/Dose Estimates		
					Man-hrs	Dose Rate (mR-hr)	Dose (Rem)
N3B	N3B-NV	B-D	B3.90	23.75"	10	60	Note 2
	N3B-IR	B-D	B3.100	23.75"			
N3C	N3C-NV	B-D	B3.90	23.75"	10	60	0.600
	N3C-IR	B-D	B3.100	23.75"			
N3D	N3D-NV	B-D	B3.90	23.75"	10	60	Note 2
	N3D-IR	B-D	B3.100	23.75"			
N5A	N5A-NV	B-D	B3.90	8.78"	6	30	Note 2
	N5A-IR	B-D	B3.100	8.78"			
N5B	N5B-NV	B-D	B3.90	8.78"	6	30	Note 2
	N5B-IR	B-D	B3.100	8.78"			
N6A	N6A-NV	B-D	B3.90	6-7/32"	6	15	Note 2
	N6A-IR	B-D	B3.100	6-7/32"			
N6B	N6B-NV	B-D	B3.90	6-7/32"	6	15	0.090
	N6B-IR	B-D	B3.100	6-7/32"			
N7	N7-NV	B-D	B3.90	4-1/4"	5	30	Note 2
	N7-IR	B-D	B3.100	4-1/4"			
N8A	N8A-NV	B-D	B3.90	3-13/16"	5	40	Note 2
	N8A-IR	B-D	B3.100	3-13/16"			
N8B	N8B-NV	B-D	B3.90	3-13/16"	5	40	0.200
	N8B-IR	B-D	B3.100	3-13/16"			
Total Dose Savings for Remainder of the 2nd Interval					3.53 Rem		

Note 2: Previously examined during the interval. Not included in dose savings.

### Attachment A - Applicable Nozzles / Inner Radius for Unit 3

RPV Nozzle	Component ID	Category	Item Number	Nozzle ID (NOM)	Comments/Dose Estimates		
					Man-hrs	Dose Rate (mR-hr)	Dose (Rem)
N2A	N2A-NV	B-D	B3.90	11.56"	8	85	0.680
	N2A-IR	B-D	B3.100	11.56"			
N2B	N2B-NV	B-D	B3.90	11.56"	8	85	Note 3
	N2B-IR	B-D	B3.100	11.56"			
N2C	N2C-NV	B-D	B3.90	11.56"	8	85	0.680
	N2C-IR	B-D	B3.100	11.56"			
N2D	N2D-NV	B-D	B3.90	11.56"	8	85	Note 3
	N2D-IR	B-D	B3.100	11.56"			
N2E	N2E-NV	B-D	B3.90	11.56"	8	85	0.680
	N2E-IR	B-D	B3.100	11.56"			
N2F	N2F-NV	B-D	B3.90	11.56"	8	85	Note 3
	N2F-IR	B-D	B3.100	11.56"			
N2G	N2G-NV	B-D	B3.90	11.56"	8	85	0.680
	N2G-IR	B-D	B3.100	11.56"			
N2H	N2H-NV	B-D	B3.90	11.56"	8	85	0.680
	N2H-IR	B-D	B3.100	11.56"			
N2J	N2J-NV	B-D	B3.90	11.56"	8	85	0.680
	N2J-IR	B-D	B3.100	11.56"			
N2K	N2K-NV	B-D	B3.90	11.56"	8	85	0.680
	N2K-IR	B-D	B3.100	11.56"			
N3A	N3A-NV	B-D	B3.90	23.75"	10	60	0.600
	N3A-IR	B-D	B3.100	23.75"			

RPV Nozzle	Component ID	Category	Item Number	Nozzle ID (NOM)	Comments/Dose Estimates		
					Man-hrs	Dose Rate (mR-hr)	Dose (Rem)
N3B	N3B-NV	B-D	B3.90	23.75"	10	60	Note 3
	N3B-IR	B-D	B3.100	23.75"			
N3C	N3C-NV	B-D	B3.90	23.75"	10	60	0.600
	N3C-IR	B-D	B3.100	23.75"			
N3D	N3D-NV	B-D	B3.90	23.75"	10	60	0.600
	N3D-IR	B-D	B3.100	23.75"			
N5A	N5A-NV	B-D	B3.90	8.78"	6	30	Note 3
	N5A-IR	B-D	B3.100	8.78"			
N5B	N5B-NV	B-D	B3.90	8.78"	6	30	0.180
	N5B-IR	B-D	B3.100	8.78"			
N6A	N6A-NV	B-D	B3.90	6-7/32"	6	15	Note 3
	N6A-IR	B-D	B3.100	6-7/32"			
N6B	N6B-NV	B-D	B3.90	6-7/32"	6	15	0.090
	N6B-IR	B-D	B3.100	6-7/32"			
N7	N7-NV	B-D	B3.90	4-1/4"	5	30	0.150
	N7-IR	B-D	B3.100	4-1/4"			
N8A	N8A-NV	B-D	B3.90	3-13/16"	5	40	Note 3
	N8A-IR	B-D	B3.100	3-13/16"			
N8B	N8B-NV	B-D	B3.90	3-13/16"	5	40	0.200
	N8B-IR	B-D	B3.100	3-13/16"			
Total Dose Savings for Remainder of 3rd Interval					7.18 Rem		

Note 3: Previously examined during the interval. Not included in dose savings

**Attachment B**  
**Responses to NRC Plant Specific Applicability**

**Unit 1**

- (1) The maximum Reactor Pressure Vessel (RPV) heatup / cooldown rate is limited to less than 115°F/hour.

Technical Specification Surveillance Requirement SR 3.4.9.1.b limits RCS heatup and cooldown rates to less than or equal to 100°F in any 1 hour period.

Recirculation Inlet Nozzles		Recirculation Outlet Nozzles	
(2) $(pr/t)/C_{RPV} < 1.15$		(4) $(pr/t)/C_{RPV} < 1.15$	
p = RPV normal operating pressure	1035	p = RPV normal operating pressure	1035
r = RPV inner radius	125-11/16"	r = RPV inner radius	125-11/16"
t = RPV wall thickness	6.125"	t = RPV wall thickness	6.125"
$C_{RPV}$	19332	$C_{RPV}$	16171
<b>1.0986 &lt; 1.15</b>		<b>1.3134 &gt; 1.15: Criterion <u>Not</u> Satisfied</b>	
(3) $[p(r_o^2 + r_i^2)/(r_o^2 - r_i^2)]/C_{NOZZLE} < 1.15$		(5) $[p(r_o^2 + r_i^2)/(r_o^2 - r_i^2)]/C_{NOZZLE} < 1.15$	
p = RPV normal operating pressure	1035	p = RPV normal operating pressure	1035
$r_o$ = nozzle outer radius	12.5"	$r_o$ = nozzle outer radius	26.5"
$r_i$ = nozzle inner radius	5.941"	$r_i$ = nozzle inner radius	15.566"
$C_{NOZZLE}$	1637	$C_{NOZZLE}$	1977
<b>1.0012 &lt; 1.15</b>		<b>1.0751 &lt; 1.15</b>	

**Attachment B**  
**Responses to NRC Plant Specific Applicability**

**Unit 2**

- (1) The maximum Reactor Pressure Vessel (RPV) heatup / cooldown rate is limited to less than 115°F/hour.

Technical Specification Surveillance Requirement SR 3.4.9.1.b limits RCS heatup and cooldown rates to less than or equal to 100°F in any 1 hour period.

Recirculation Inlet Nozzles		Recirculation Outlet Nozzles	
(2) $(pr/t)/C_{RPV} < 1.15$		(4) $(pr/t)/C_{RPV} < 1.15$	
p = RPV normal operating pressure	1035	p = RPV normal operating pressure	1035
r = RPV inner radius	125-11/16"	r = RPV inner radius	125-11/16"
t = RPV wall thickness	6.125"	t = RPV wall thickness	6.125"
$C_{RPV}$	19332	$C_{RPV}$	16171
<b>1.0986 &lt; 1.15</b>		<b>1.3134 &gt; 1.15: Criterion <u>Not</u> Satisfied</b>	
(3) $[p(r_o^2 + r_i^2)/(r_o^2 - r_i^2)]/C_{NOZZLE} < 1.15$		(5) $[p(r_o^2 + r_i^2)/(r_o^2 - r_i^2)]/C_{NOZZLE} < 1.15$	
p = RPV normal operating pressure	1035	p = RPV normal operating pressure	1035
$r_o$ = nozzle outer radius	12.5"	$r_o$ = nozzle outer radius	26.5"
$r_i$ = nozzle inner radius	5.941"	$r_i$ = nozzle inner radius	15.566"
$C_{NOZZLE}$	1637	$C_{NOZZLE}$	1977
<b>1.0012 &lt; 1.15</b>		<b>1.0751 &lt; 1.15</b>	

**Attachment B**  
**Responses to NRC Plant Specific Applicability**

**Unit 3**

- (1) The maximum Reactor Pressure Vessel (RPV) heatup / cooldown rate is limited to less than 115°F/hour.

Technical Specification Surveillance Requirement SR 3.4.9.1.b limits RCS heatup and cooldown rates to less than or equal to 100°F in any 1 hour period.

Recirculation Inlet Nozzles		Recirculation Outlet Nozzles	
(2) $(pr/t)/C_{RPV} < 1.15$		(4) $(pr/t)/C_{RPV} < 1.15$	
p = RPV normal operating pressure	1035	p = RPV normal operating pressure	1035
r = RPV inner radius	125-11/16"	r = RPV inner radius	125-11/16"
t = RPV wall thickness	6.125"	t = RPV wall thickness	6.125"
$C_{RPV}$	19332	$C_{RPV}$	16171
<b>1.0986 &lt; 1.15</b>		<b>1.3134 &gt; 1.15: Criterion Not Satisfied</b>	
(3) $[p(r_o^2 + r_i^2)/(r_o^2 - r_i^2)]/C_{NOZZLE} < 1.15$		(5) $[p(r_o^2 + r_i^2)/(r_o^2 - r_i^2)]/C_{NOZZLE} < 1.15$	
p = RPV normal operating pressure	1035	p = RPV normal operating pressure	1035
$r_o$ = nozzle outer radius	12.5"	$r_o$ = nozzle outer radius	26.5"
$r_i$ = nozzle inner radius	5.941"	$r_i$ = nozzle inner radius	15.566"
$C_{NOZZLE}$	1637	$C_{NOZZLE}$	1977
<b>1.0012 &lt; 1.15</b>		<b>1.0751 &lt; 1.15</b>	



## Attachment C

### Unit 1 Applicable Nozzles

Component ID	Category Number	Item Number	System	Nominal Pipe Size	CYCLE		DATE		Comments
N2A-NV <sup>(Note 1)</sup>	B-D	B3.90	Recirc Inlet	12"	4		5/06/81 5/10/81 5/09/81		
N2A-IR <sup>(Note 1)</sup>	B-D	B3.100	Recirc Inlet	12"	4		5/09/81		
N2B-NV <sup>(Note 1)</sup>	B-D	B3.90	Recirc Inlet	12"	4		5/04/81 5/10/81 5/08/81		
N2B-IR <sup>(Note 1)</sup>	B-D	B3.100	Recirc Inlet	12"	4		5/08/81		
N2C-NV <sup>(Note 1)</sup>	B-D	B3.90	Recirc Inlet	12"	4		5/10/81 5/06/81		
N2C-IR <sup>(Note 1)</sup>	B-D	B3.100	Recirc Inlet	12"	4		5/09/81		
N2D-NV <sup>(Note 1)</sup>	B-D	B3.90	Recirc Inlet	12"	4		5/04/81 5/10/81		
N2D-IR <sup>(Note 1)</sup>	B-D	B3.100	Recirc Inlet	12"	4		5/12/81		
N2E-NV <sup>(Note 1)</sup>	B-D	B3.90	Recirc Inlet	12"	1	6R	12/8/75	4/11/06	PDI Exam 6R
N2E-IR <sup>(Note 1)</sup>	B-D	B3.100	Recirc Inlet	12"	1		12/5/75		
N2F-NV <sup>(Note 1)</sup>	B-D	B3.90	Recirc Inlet	12"	4	6R	5/10/81 5/05/81	4/11/06	PDI Exam 6R
N2F-IR <sup>(Note 1)</sup>	B-D	B3.100	Recirc Inlet	12"	4		5/12/81		
N2G-NV <sup>(Note 1)</sup>	B-D	B3.90	Recirc Inlet	12"	2	6R	12/13/78	2/15/06	PDI Exam 6R
N2G-IR <sup>(Note 1)</sup>	B-D	B3.100	Recirc Inlet	12"	2		10/8/79		
N2H-NV	B-D	B3.90	Recirc Inlet	12"	6R		5/24/05		PDI Exam 6R
N2H-IR	B-D	B3.100	Recirc Inlet	12"	6R		9/14/05		
N2J-NV <sup>(Note 1)</sup>	B-D	B3.90	Recirc Inlet	12"	5	6R	6/17/83 6/16/83	2/15/06	PDI Exam 6R
N2J-IR <sup>(Note 1)</sup>	B-D	B3.100	Recirc Inlet	12"	5		6/18/83		
N2K-NV	B-D	B3.90	Recirc Inlet	12"	6R		5/24/05		PDI Exam 6R
N2K-IR	B-D	B3.100	Recirc Inlet	12"	6R		9/14/05		
N3A-NV	B-D	B3.90	Main Steam	26"	6R		9/13/05		PDI Exam 6R
N3A-IR	B-D	B3.100	Main Steam	26"	6R		1/10/07		
N3B-NV	B-D	B3.90	Main Steam	26"	6R		9/19/05		PDI Exam 6R
N3B-IR	B-D	B3.100	Main Steam	26"	6R		1/10/07		
N3C-NV <sup>(Note 1)</sup>	B-D	B3.90	Main Steam	26"	4		5/11/81 5/07/81 5/09/81		
N3C-IR <sup>(Note 1)</sup>	B-D	B3.100	Main Steam	26"	4		5/16/81		
N3D-NV <sup>(Note 1)</sup>	B-D	B3.90	Main Steam	26"	2		12/08/78		
N3D-IR <sup>(Note 1)</sup>	B-D	B3.100	Main Steam	26"	2		1/09/79		
N5A-NV	B-D	B3.90	Core Spray	10"	1		12/08/78		
N5A-IR	B-D	B3.100	Core Spray	10"	1		1/09/79		
N5B-NV	B-D	B3.90	Core Spray	10"	5	6R	5/04/81 5/05/81 5/06/81	4/17/06	PDI Exam 6R
N5B-IR	B-D	B3.100	Core Spray	10"	5		5/08/81		

## Attachment C

### Unit 1 Applicable Nozzles (Continued)

Component ID	Category Number	Item Number	System	Nominal Pipe Size	CYCLE		DATE		Comments
N6A-NV <sup>(Note 1)</sup>	B-D	B3.90	Head Vent	6"	5		4/24/81 4/29/81		
N6A-IR <sup>(Note 1)</sup>	B-D	B3.100	Head Vent	6"	5	6	4/24/81	8/16/85	
N6B-NV <sup>(Note 1)</sup>	B-D	B3.90	Head Vent	6"	6		8/13/85 8/12/85 8/14/85 8/16/85		
N6B-IR <sup>(Note 1)</sup>	B-D	B3.100	Head Vent	6"	6		8/16/85		
N7-NV <sup>(Note 1)</sup>	B-D	B3.90	Head Vent	4"	5		4/24/81 4/29/81		
N7-IR <sup>(Note 1)</sup>	B-D	B3.100	Head Vent	4"	5	6	4/24/81	8/16/85	
N8A-NV	B-D	B3.90	Jet Pump Inst	4"	5	6R	5/30/81	2/21/06	PDI Exam 6R
N8A-IR	B-D	B3.100	Jet Pump Inst	4"	5		5/30/81		
N8B-NV <sup>(Note 1)</sup>	B-D	B3.90	Jet Pump Inst	4"	1	6R	12/13/78	5/25/05	PDI Exam 6R
N8B-IR	B-D	B3.100	Jet Pump Inst	4"	6R		9/14/05		

Note 1: The examination method (UT) and techniques utilized in the First Ten-Year ISI Interval documented the scan limitations on the NDE reports.

Note 2: "6R" refers to the Unit 1 restart which concluded the extended outage (1984 to 2007) for the unit.

## Attachment C

### Unit 2 Applicable Nozzles

Component ID	Category Number	Item Number	System	Nominal Pipe Size	CYCLE		DATE		Comments
N2A-NV	B-D	B3.90	Recirc Inlet	12"		14		3/19/07	PDI Exam
N2A-IR	B-D	B3.100	Recirc Inlet	12"		14		3/16/07	
N2B-NV <sup>(Note 2)</sup>	B-D	B3.90	Recirc Inlet	12"	12	14	3/3/03	3/19/07	PDI Exam
N2B-IR	B-D	B3.100	Recirc Inlet	12"	12		3/7/03		
N2C-NV	B-D	B3.90	Recirc Inlet	12"		14		3/19/07	PDI Exam
N2C-IR	B-D	B3.100	Recirc Inlet	12"		14		3/16/07	
N2D-NV <sup>(Note 2)</sup>	B-D	B3.90	Recirc Inlet	12"		14		3/22/07	PDI Exam
N2D-IR	B-D	B3.100	Recirc Inlet	12"					
N2E-NV	B-D	B3.90							
N2E-IR	B-D	B3.100							
N2F-NV	B-D	B3.90	Recirc Inlet	12"	12		3/3/03		PDI Exam
N2F-IR	B-D	B3.100	Recirc Inlet	12"	12		3/7/03		
N2G-NV	B-D	B3.90	Recirc Inlet	12"		14		3/13/07	PDI Exam
N2G-IR	B-D	B3.100	Recirc Inlet	12"		14		3/16/07	
N2H-NV	B-D	B3.90	Recirc Inlet	12"		14		3/20/07	PDI Exam
N2H-IR	B-D	B3.100	Recirc Inlet	12"		14		3/16/07	
N2J-NV	B-D	B3.90	Recirc Inlet	12"	12		3/3/03		PDI Exam
N2J-IR	B-D	B3.100	Recirc Inlet	12"	12		3/7/03		
N2K-NV <sup>(Note 2)</sup>	B-D	B3.90	Recirc Inlet	12"		14		3/21/07	PDI Exam
N2K-IR	B-D	B3.100	Recirc Inlet	12"					
N3A-NV <sup>(Note 2)</sup>	B-D	B3.90	Main Steam	26"		14		3/22/07	PDI Exam
N3A-IR	B-D	B3.100	Main Steam	26"					
N3B-NV	B-D	B3.90	Main Steam	26"		14		3/15/07	PDI Exam
N3B-IR	B-D	B3.100	Main Steam	26"		14		3/16/07	
N3C-NV <sup>(Note 2)</sup>	B-D	B3.90	Main Steam	26"		14		3/22/07	PDI Exam
N3C-IR	B-D	B3.100	Main Steam	26"					
N3D-NV	B-D	B3.90	Main Steam	26"	12		3/1/03		PDI Exam
N3D-IR	B-D	B3.100	Main Steam	26"	12		3/3/03		
N5A-NV	B-D	B3.90	Core Spray	10"		14		3/14/07	PDI Exam
N5A-IR	B-D	B3.100	Core Spray	10"		14		3/16/07	
N5B-NV	B-D	B3.90	Core Spray	10"		14		3/23/07	PDI Exam
N5B-IR	B-D	B3.100	Core Spray	10"		14		3/16/07	
N6A-NV	B-D	B3.90	Head Vent	6"	12		2/28/03		PDI Exam
N6A-IR	B-D	B3.100	Head Vent	6"	12		3/1/03		
N6B-NV	B-D	B3.90	Head Vent	6"					
N6B-IR	B-D	B3.100	Head Vent	6"					
N7-NV	B-D	B3.90	Head Vent	4"		14	3/2/07		PDI Exam
N7-IR	B-D	B3.100	Head Vent	4"		14	3/2/07		

## Attachment C

### Unit 2 Applicable Nozzles (Continued)

Component ID	Category Number	Item Number	System	Nominal Pipe Size	CYCLE		DATE		Comments
N8A-NV	B-D	B3.90	Jet Pump Inst	4"	12		3/5/03		PDI Exam
N8A-IR	B-D	B3.100	Jet Pump Inst	4"	12		3/7/03		
N8B-NV <sup>(Note 2)</sup>	B-D	B3.90	Jet Pump Inst	4"				3/22/07	PDI Exam
N8B-IR	B-D	B3.100	Jet Pump Inst	4"					

Note 2: RPV Nozzles; N2B-NV, N2D-NV, N2K-NV, N3A-NV, N3C-NV, and N8B-NV were expanded scope examinations for Cycle 14 due to the N9-NV failing UT examination. The N9-NV indication did not meet IWB-3500 criteria. It was determined to be a sub-surface flaw not serviced induced. The flaw was evaluated and accepted as is for continued operation.

Note: Examinations listed for Unit 2 in this attachment are for the current Ten-Year ISI interval. Examinations for the nozzle-to-vessel welds and inner radius sections in previous ISI intervals were completed in accordance with ASME Section XI Code requirements.

## Attachment C

### Unit 3 Applicable Nozzles

Component ID	Category Number	Item Number	System	Nominal Pipe Size	CYCLE		DATE		Comments
N2A-NV	B-D	B3.90	Recirc Inlet	12"					
N2A-IR	B-D	B3.100	Recirc Inlet	12"					
N2B-NV	B-D	B3.90	Recirc Inlet	12"	12		3/10/06		PDI Exam
N2B-IR	B-D	B3.100	Recirc Inlet	12"	12		3/7/06		
N2C-NV	B-D	B3.90	Recirc Inlet	12"					
N2C-IR	B-D	B3.100	Recirc Inlet	12"					
N2D-NV	B-D	B3.90	Recirc Inlet	12"	12		3/10/06		PDI Exam
N2D-IR	B-D	B3.100	Recirc Inlet	12"	12		3/7/06		
N2E-NV	B-D	B3.90	Recirc Inlet	12"					
N2E-IR	B-D	B3.100	Recirc Inlet	12"					
N2F-NV	B-D	B3.90	Recirc Inlet	12"	12		3/10/06		PDI Exam
N2F-IR	B-D	B3.100	Recirc Inlet	12"	12		3/7/06		
N2G-NV <sup>(Note 3)</sup>	B-D	B3.90	Recirc Inlet	12"	12		3/7/06		PDI Exam
N2G-IR <sup>(Note 3)</sup>	B-D	B3.100	Recirc Inlet	12"	12		3/17/06		
N2H-NV <sup>(Note 3)</sup>	B-D	B3.90	Recirc Inlet	12"	12		3/17/06		PDI Exam
N2H-IR <sup>(Note 3)</sup>	B-D	B3.100	Recirc Inlet	12"	12		3/7/06		
N2J-NV <sup>(Note 3)</sup>	B-D	B3.90	Recirc Inlet	12"	12		3/17/06		PDI Exam
N2J-IR <sup>(Note 3)</sup>	B-D	B3.100	Recirc Inlet	12"	12		3/7/06		
N2K-NV <sup>(Note 3)</sup>	B-D	B3.90	Recirc Inlet	12"	12		3/10/06		PDI Exam
N2K-IR <sup>(Note 3)</sup>	B-D	B3.100	Recirc Inlet	12"	12		3/7/06		
N3A-NV	B-D	B3.90	Main Steam	26"					
N3A-IR	B-D	B3.100	Main Steam	26"					
N3B-NV	B-D	B3.90	Main Steam	26"	12		3/7/06		PDI Exam
N3B-IR	B-D	B3.100	Main Steam	26"	12		3/7/06		
N3C-NV <sup>(Note 3)</sup>	B-D	B3.90	Main Steam	26"	12*		3/17/06		PDI Exam
N3C-IR <sup>(Note 3)</sup>	B-D	B3.100	Main Steam	26"	12*		3/7/06		
N3D-NV <sup>(Note 3)</sup>	B-D	B3.90	Main Steam	26"	12*		3/17/06		PDI Exam
N3D-IR <sup>(Note 3)</sup>	B-D	B3.100	Main Steam	26"	12*		3/7/06		
N5A-NV	B-D	B3.90	Core Spray	10"	12		3/08/06		PDI Exam
N5A-IR	B-D	B3.100	Core Spray	10"	12		3/7/06		
N5B-NV	B-D	B3.90	Core Spray	10"					
N5B-IR	B-D	B3.100	Core Spray	10"					
N6A-NV	B-D	B3.90	Head Vent	6"	13		3/27/08		PDI Exam
N6A-IR	B-D	B3.100	Head Vent	6"	13		3/25/08		
N6B-NV	B-D	B3.90	Head Vent	6"					
N6B-IR	B-D	B3.100	Head Vent	6"					

## Attachment C

### Unit 3 Applicable Nozzles (Continued)

Component ID	Category Number	Item Number	System	Nominal Pipe Size	CYCLE		DATE		Comments
N7-NV	B-D	B3.90	Head Vent	4"					
N7-IR	B-D	B3.100	Head Vent	4"					
N8A-NV	B-D	B3.90	Jet Pump Inst	4"	12		3/7/06		PDI Exam
N8A-IR	B-D	B3.100	Jet Pump Inst	4"	12		3/7/06		
N8B-NV <sup>(Note 3)</sup>	B-D	B3.90	Jet Pump Inst	4"	12		3/17/06		PDI Exam
N8B-IR <sup>(Note 3)</sup>	B-D	B3.100	Jet Pump Inst	4"	12		3/7/06		

Note 3: Cycle 11 RPV Nozzles: N2G-NV, N2G-IR, N2H-NV, N2H-IR, N2J-NV, N2J-IR, N2K-NV, N2K-IR, N3C-NV, N3C-IR, N3D-NV, N3D-IR, and N8B-NV, N8B-IR, were deferred to Cycle 12, 3rd Interval.

Note: Examinations listed for Unit 3 in this attachment are for the current Ten-Year ISI interval. Examinations for the nozzle-to-vessel welds and inner radius sections in previous ISI intervals were completed in accordance with ASME Section XI Code requirements.