

September 5, 2002

10 CFR 50.55a(a)(3)

U.S. Nuclear Regulatory Commission
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Washington, D.C. 20555-0001

Gentlemen:

In the Matter of) Docket No. 50-260
Tennessee Valley Authority)

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 2 - AMERICAN SOCIETY
OF MECHANICAL ENGINEERS (ASME) SECTION XI, INSERVICE INSPECTION
(ISI) PROGRAM - CLARIFICATION AND CHANGES TO REQUESTS FOR
RELIEF 2-ISI-16 AND 2-ISI-17

This letter provides clarification and changes to BFN Unit 2 requests for relief 2-ISI-16 and 2-ISI-17. TVA submitted, by letter dated April 23, 2002, requests for relief 2-ISI-16 and 2-ISI-17 for the Unit 2 ASME Section XI Inservice Inspection Program for the Browns Ferry Nuclear Plant.

Requests for relief 2-ISI-16 and 2-ISI-17 provide alternative requirements for the examination of the BFN Unit 2 reactor pressure vessel nozzles using a direct enhanced visual examination for the RPV head nozzles and a remote enhanced visual examination for the RPV nozzles (except feedwater nozzles) rather than the Code prescribed volumetric examination. The feedwater nozzles will continue to receive a volumetric examination. During its review of the BFN requests for relief, the NRC staff identified questions regarding TVA's proposed alternate examinations.

TVA and the NRC staff held teleconferences on June 17, and August 21, 2002, to discuss the NRC questions. As a result of those teleconferences, TVA is providing clarification and changes to its proposed alternative examinations stated in requests for relief 2-ISI-16 and 2-ISI-17. The enclosure to this letter lists the six NRC questions and provides the corresponding TVA response.

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TVA seeks review of these requests for relief by September 30, 2002, to support resource planning for the Unit 2 Cycle 12 (Spring 2003) refueling outage.

If you have any questions, please contact me at (256) 729-2636.

Sincerely,

original signed by

T. E. Abney
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Enclosure

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Enclosure

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ENCLOSURE

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI,
INSERVICE INSPECTION (ISI) PROGRAM
(THIRD TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF 2-ISI-16 AND 2-ISI-17
RESPONSE TO NRC QUESTIONS

TVA submitted BFN requests for relief 2-ISI-16 and 2 -ISI-17 allowing the use of an enhanced visual examination for the reactor pressure vessel (RPV) in lieu of the ASME Section XI Code specified ultrasonic examination. With regards to these relief requests, the staff has the following questions/requests:

NRC Question No. 1

Provide a list/table of the nozzles, nozzle sizes, percent coverage from prior examinations, and when (month/year) the examinations occurred.

TVA Response

See table below. Note that enhanced visual examination coverage percentages are estimates only.

Ultrasonic Examination					Enhanced Visual Examination
Nozzle	Size	Date Examined	Report No.	Actual % Coverage	Estimated % Coverage
N1A-IR	28"	10/94	BF2-1002	100	100
N1B-IR	28"	10/97	R-207A	100	100
N2A-IR	12"	11/97	R-208A	100	50
N2B-IR	12"	10/94	BF2-1022	100	50
N2C-IR	12"	11/97	R-209A	100	50
N2D-IR	12"	04/01	R-126A	100	50
N2E-IR	12"	04/01	R-127A	100	50
N2F-IR	12"	10/94	BF2-1024	100	50
N2G-IR	12"	10/97	R-210A	100	50
N2H-IR	12"	10/97	R-211A	100	50
N2J-IR	12"	10/94	BF2-1026	100	50
N2K-IR	12"	04/01	R-128A	100	50
N3A-IR	26"	04/01	R-129A	100	100
N3B-IR	26"	11/97	R-212A	100	100
N3C-IR	26"	04/01	R-130A	100	100
N3D-IR	26"	10/94	BF2-1004	100	100
N5A-IR	10"	10/94	BF2-1028	100	40
N5B-IR	10"	10/97	R-215A	100	40
N6A-IR	6"	02/93	R-0063	100	100
N6B-IR	6"	4/99	R-331	100	100
N7-IR	4"	4/99	R-335	100	100
N8A-IR	4"	10/94	BF2-1011	73	60
N8B-IR	4"	04/01	R-133A	100	60
*N9-IR	4"	10/97	R-216A	100	100

***Non-operational/capped**

NRC Question No. 2

Discuss the effects on coverage as a result of changing the examination method from UT to VT.

TVA Response

For 2-ISI-17, the visual examination coverage will be approximately the percentages shown in the table above. As stated in the relief request, limitations are due to the reactor internal piping configuration preventing placement of the camera in all positions necessary for 100 percent coverage.

Visual examination of the inner radius region is limited because reactor internal piping configuration prevents placement of the camera in all positions necessary to examine the M-N surface over the full circumference. (See TVA response to NRC Question number six for specific description of the obstructions.)

The requirement for inner radius examinations was deterministically made early in the development of ASME Section XI, and applied to 100 percent of nozzles welded with full penetration welds. Fatigue cracking is the only applicable degradation mechanism for the nozzle inner radius region. For all nozzles, except feedwater and operational CRD, there is no significant thermal cycling during operation. In addition, no service related cracking has ever been discovered in any of the BWR plant nozzles other than feedwater and operational CRD returns.

Reference: White Paper ISI-99-26, "Technical Basis For Elimination of Reactor Vessel Nozzle Inner Radius Inspections."

NRC Question No. 3

Describe the direct/enhanced visual examination systems and the resolution sensitivity that will be used during the examinations. Discuss how the 1-mil resolution sensitivity will be demonstrated for each system.

TVA Response

The direct enhanced visual examination of the reactor pressure vessel (RPV) head nozzles (N6A, N6B, and N7) inner radius sections, will be performed in accordance with ASME Section XI VT-1 requirements. Resolution sensitivity for the direct enhanced visual examination will be demonstrated utilizing a vision test chart containing a 1-mil wire at a maximum distance of 2 feet, in lieu of the 0.044 inch character required by IWA-2210 of ASME Section XI 1995 Edition, 1996 Addenda.

Remote in-vessel enhanced visual examinations will be performed for all other nozzles (except feedwater) with approved procedures requiring that the resolution sensitivity be established using a 1-mil wire standard. This is consistent with that used for IVVI (reactor pressure vessel internal examinations) intended to detect cracking.

Note: IVVI examinations typically utilize a Sensitivity, Resolution and Contrast Standard (SRCS) which is fabricated with a surface texture representative of the surface to be

examined or the actual surface to be examined may be used. A target (1-mil wire) is superimposed over the SRCS or surface to be examined. Equipment resolution and sensitivity is demonstrated prior to performing examinations. Resolution and sensitivity of the examination equipment and technique is considered adequate when the system is capable of discerning the required target.

Listed below are the RPV nozzles within the scope of this request for relief and the type of enhanced visual (direct or remote) examination to be performed.

Nozzle	Size	Exam Type	Nozzle	Size	Exam Type
N1A-IR	28"	Enhanced Remote	N6A-IR	6"	Enhanced Direct
N1B-IR	28"	Enhanced Remote	N6B-IR	6"	Enhanced Direct
N2A-IR	12"	Enhanced Remote	N7-IR	4"	Enhanced Direct
N2B-IR	12"	Enhanced Remote	N8A-IR	4"	Enhanced Remote
N2C-IR	12"	Enhanced Remote	N8B-IR	4"	Enhanced Remote
N2D-IR	12"	Enhanced Remote	*N9-IR	4"	Enhanced Remote
N2E-IR	12"	Enhanced Remote	N3A-IR	26"	Enhanced Remote
N2F-IR	12"	Enhanced Remote	N3B-IR	26"	Enhanced Remote
N2G-IR	12"	Enhanced Remote	N3C-IR	26"	Enhanced Remote
N2H-IR	12"	Enhanced Remote	N3D-IR	26"	Enhanced Remote
N2J-IR	12"	Enhanced Remote	N5A-IR	10"	Enhanced Remote
N2K-IR	12"	Enhanced Remote	N5B-IR	10"	Enhanced Remote

***Non-operational/capped**

Note: The RPV feedwater nozzles are not within the scope of this request for relief and will continue to receive a volumetric examination in accordance with ASME Section XI, Table IWB-2500.

NRC Question No. 4

The bases for these relief requests is ASME Code Case N-648-1, which references Table-IWB 3510-3 as the allowable linear crack acceptance criteria. This appears to be in conflict with the acceptance criteria in Table IWB-3512-1 for the inner radius. Discuss using Table IWB-3510-3 as the acceptance criteria, and include any data supporting your position.

TVA Response

TVA will perform enhanced visual examinations for the following RPV nozzles inner radius sections as an alternative to the ASME Section XI Code required volumetric examinations. (Specific nozzles are listed in TVA's response to NRC question number 3.)

- RPV head nozzles (3 nozzles) will be examined using a direct enhanced visual (VT-1) examination, with sufficient lighting, capable of a 1-mil resolution at a maximum distance of 2 feet.
- The remaining RPV nozzles (21 nozzles), will be examined using a remote enhanced visual (VT-1) examination, with sufficient magnification and lighting, capable of a 1-mil resolution.

TVA's original submittal referenced ASME Section XI Code Case N-648-1 and Table IWB-3510-3. Instead, TVA will utilize the acceptance criteria of Table IWB-3512-1 of the 1995 Edition, 1996 Addenda of Section XI for the examination. The conservative approach is to use Table IWB-3512-1 utilizing an aspect ratio of 0.50 and surface flaw depth of 2.5 percent for calculating the flaw acceptance criteria. For Table IWB-3512-1, the depth of a crack indication is assumed to be one half of the measured length of the crack indication.

Crack-like surface flaws exceeding the acceptance criteria of ASME Section XI Code, Table IWB-3512-1 are considered unacceptable for continued service unless the reactor pressure vessel meets the requirements of IWB-3142.2, IWB-3142.3 or IWB-3142.4.

NRC Question No. 5

Provide a description for the performance of the proposed enhanced direct visual examination of the RPV head nozzles that will assure a 1-mil resolution.

TVA Response

The direct enhanced visual examination of the reactor pressure vessel (RPV) head nozzles (N6A, N6B, and N7) inner radius sections, will be performed in accordance with ASME Section XI VT-1 requirements. Resolution sensitivity for the direct enhanced visual examination will be demonstrated utilizing a vision test chart containing a 1-mil wire at a maximum distance of 2 feet, in lieu of the 0.044 inch character required by IWA-2210 of ASME Section XI 1995 Edition, 1996 Addenda.

NRC Question No. 6

Discuss the obstructions that will limit full coverage for the remote enhanced visual examination of the Recirculation, Core Spray, and Jet-Pump Instrumentation nozzles inner radius section.

TVA Response

Visual examination of the inner radius region is limited because reactor internal piping configuration prevents placement of the camera in all positions necessary to examine the M-N surface over the full circumference. The limitations are described below.

N-5A and N-5B, Core Spray nozzles - Core spray thermal sleeve and tee box and feed water sparger. Feedwater spargers are located above the core spray nozzle and the configuration of the core spray thermal sleeve and tee box prohibits placement of the camera 360 degrees around the nozzle. The limitations are at the top position at approximate clock positions 10:00 to 2:00, and the bottom position at approximate clock positions 4:00 to 8:00.

N-2 nozzles (10), Recirculation Inlet - Thermal sleeve and jet pump riser piping. The inaccessible area is the inside bend radius of elbow at approximate clock positions 11:00 to 1:00, and at the bottom outside diameter bend of the elbow at approximate clock positions 5:00 to 7:00. The limitations are due to the proximity of the of the jet pump risers.

N-8A and N-8B nozzles, Jet-Pump Instrumentation - 12 Instrumentation lines pass through the vessel wall into the vessel. The core shroud support plate is located directly beneath the nozzle preventing placement of the camera from approximate clock positions 4:00 to 8:00.