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10 CFR 50.4
10 CFR 50.55a

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

Browns Ferry Nuclear Plant, Unit 1
Facility Operating License No. DPR-33
NRC Docket No. 50-259

Subject: **Response to Request for Additional Information - American Society of Mechanical Engineers, Section XI Inservice Inspection Program for the Unit 1 Second Ten-Year Inspection Interval, Request for Relief 1-ISI-26, Risk-Informed Inservice Inspection Program**

References:

1. Letter from the Nuclear Regulatory Commission to the Tennessee Valley Authority, "Browns Ferry Nuclear Plant, Unit 1 - Request for Additional Information Regarding Request for Relief 1-ISI-26, Risk Informed Inservice Inspection Program," dated October 21, 2010

2. Letter from the Tennessee Valley Authority to the Nuclear Regulatory Commission, "American Society of Mechanical Engineers, Section XI Inservice Inspection Program for the Unit 1 Second Ten-Year Inspection Interval, Request for Relief 1-ISI-26, Risk-Informed Inservice Inspection Program," dated February 11, 2010

This letter provides the Tennessee Valley Authority's (TVA's) response to a Nuclear Regulatory Commission (NRC) request for additional information (Reference 1), dated October 21, 2010. This request for additional information concerned the Browns Ferry Nuclear Plant (BFN) Unit 1, American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI Inservice Inspection Program, Request for Relief 1-ISI-26 (Reference 2). The Request for Relief seeks to use, in accordance with 10 CFR 50.55a(a)(3)(i), a risk-informed program for examination of ASME Section XI Code, Class 1 and 2 piping in lieu of the ASME Section XI requirements.

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During review of the Request for Relief, the NRC staff identified the need for additional information. TVA and the NRC staff held a teleconference on August 12, 2010, to ensure a common understanding of the information required.

The enclosure to this letter contains the requested information. No new regulatory commitments are included in this letter. If you have any questions, please contact Tom Matthews at (423) 751-2687.

Respectfully,

R. M. Krich

Enclosure: Response to NRC Request for Additional Information
Risk Informed Inservice Inspection Program, Request for Relief 1-ISI-26

cc (Enclosure):

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

Enclosure

Tennessee Valley Authority
Browns Ferry Nuclear Plant (BFN)
Unit 1

American Society of Mechanical Engineers,
Section XI Inservice Inspection Program,
Second Ten-Year Inspection Interval

Response to NRC Request for Additional Information
Risk Informed Inservice Inspection Program, Request for Relief 1-ISI-26

NRC Request No. 1

On page E1-4 of the submittal, the proposed alternative to the ISI program states that it is described in Code Case N-577 (N-577). The U.S. Nuclear Regulatory Commission (NRC) listed N-577 in Regulatory Guide 1.193, "ASME Code Cases Not Approved for Use." The NRC staff has accepted licensees' referencing N-577, Table 1 in submittals requesting relief from selected requirements of the ASME Code. If sections, other than Table 1 in N-577 are used in the proposed alternative, provide a description of the sections, their application, and technical justification.

TVA Response

Only Table 1 of ASME Code Case N-577 was directly applied to request for relief 1-ISI-26.

NRC Request No. 2

On page E1-3 of the introduction, the submittal states the purpose and lists references describing the risk-informed (RI) process. In Section 2 on page E1-4, the statement is made that the alternative RI-ISI program for piping is described in N-577. In Section 3 on page E1-5, the statement is made that the processes used to develop the RI-ISI program are consistent with the methodology described in N-577 and Westinghouse Topical report WCAP-14572, as modified by the September 30, 1998, letter to NRC, with deviations. A composite of the three descriptions indicate that the description of the proposed alternative in Section 2 is incomplete. Provide a resolution for these differences or a discussion as to the purpose for the differences.

TVA Response

The description in Section 2.1 on page E1-4 was intended to reflect the description in the Introduction on page E1-3 and in Section 3 on page E1-5. The following improved revision of the description in Section 2.1 supersedes the version previously submitted:

ASME Section XI Categories B-F, B-J, C-F-1, and C-F-2 currently contain the requirements for examining (via non-destructive examination (NDE)) piping components. This current program is limited to ASME Class 1 and Class 2 piping. An alternative risk-informed

inservice inspection (RI-ISI) program for piping is described in Code Case N-577 (Reference 6.12). The risk-informed process used in this submittal is consistent with the methodology described in Code Case N-577 and WCAP-14572, Revision 1-NP-A, with the deviations listed in Section 3. The RI-ISI program will be substituted for the current examination program on piping in accordance with 10 CFR 50.55a(a)(3)(i) by alternatively providing an acceptable level of quality and safety. Other non-related portions of the ASME Section XI Code will be unaffected.

NRC Request No. 3

Section 2.2 of the submittal states that except for intergranular stress corrosion cracking (IGSCC), all other augmented programs listed in the BFN surveillance instruction are unaffected by this submittal. As for IGSCC, the weld selection and inspection frequency is also unchanged. Table 3.8-1 shows augmented examinations. Discuss the applicability of these augmented examinations (in Table 3.8-1) to the proposed RI-ISI program. Discuss the examinations (nondestructive examination (NDE) method, examination volume, differences in NDE technique, etc.) that will be performed to detect other degradation mechanisms that may occur at the same locations being examined under an augmented inspection program.

TVA Response

Table 3.8-1 shows the examinations performed in the RI-ISI program. The reference to augmented examinations is a description of the degradation mode determined to be applicable to that inspection element. The examination identified for each element is the examination that will detect that degradation mechanism.

NRC Request No. 4

In the introduction on page E1-3, the submittal states that the RI-ISI program is consistent with WCAP-14572, Revision 1-NP-A, with listed deviations. After the issuance of WCAP-14572, Revision 1-NP-A, the topical report was updated with later revision(s), supplement(s) and addenda. Identify the updates to WCAP-14572, Revision 1-NP-A, if any, that apply to the proposed alternative.

TVA Response

No further updates to WCAP-14572, Revision 1-NP-A, apply to the proposed alternative.

NRC Request No. 5

TVA's determination of the segment failure probability is determined by summing several individual weld failure rates instead of combining all the degradation mechanisms into one weld and calculating a segment failure rate. This approach deviates from the approved WCAP method. As stated in your submittal, BFN performed a sensitivity study for Unit 3 that compared the TVA method to the approved WCAP method. The results of this study indicated that RI-ISI results (i.e., similar set of high safety significant segments) equivalent to those from the approved method were obtained. This issue was addressed in the Unit 2 evaluations by noting the similarity between Units 2 and 3, and concluding that the Unit 3 evaluations were equivalent to those from the approved Unit 2 method. However, BFN Unit 1 does not appear to be similar to Unit 2 or Unit 3. Please discuss any differences

that would affect degradation mechanisms (i.e., differences in pipe or weld materials, differences in designs affecting RI-ISI, differences in monitoring equipment, etc.), number of RI-ISI segments, or any other differences that could affect the RI-ISI program.

TVA Response

The segment failure probability is determined from the highest individual weld failure rate in a segment. This approach was the subject of the referenced sensitivity study. BFN Unit 1 is similar to Unit 3 in both material and operational aspects. Most of the piping susceptible to IGSCC was replaced with less susceptible material in both Units 1 and 3. Operationally, Unit 1 is similar to Unit 3 in that both units connect only to Unit 2 for back-up cooling potential. The Unit 3 sensitivity study represents no significant differences when applied to Unit 1.

NRC Request No. 6

In Section 3.6 on page E1-11, the submittal lists the different technical skills possessed by representatives on the expert panel. The list is a subset of the technical skills listed in the WCAP. Provide the reason for excluding any particular expertise mentioned for the expert panel in WCAP.

TVA Response

All of the skills listed in the WCAP were represented on the BFN Expert Panel. Some personnel provided more than one of the listed skills.

NRC Request No. 7

In Section 5 on page E1-23, the submittal identified 66 RI-ISI examination locations. For these welds, provide the weld identification, ASME Examination Category-Item Number, RI-ISI Item Number, examination methods, and approved examination relief requests (that apply and reason for requesting relief). (Note: Table 3.8.1 in the submittal has some of the information.)

TVA Response

Section 5 on page E1-23 identifies 66 examination locations in the combination of the proposed RI-ISI program and the BWRVIP-75 augmented inspection program. These welds and the requested additional information follow.

Weld ID	Section XI Category	Section XI Item	RI-ISI Item	Exam Method
THPCI-1-1	B-J	B9.11	R1.11	XI Vol
THPCI-1-3	B-J	B9.11	R1.11	XI Vol
THPCI-1-4	B-J	B9.11	R1.11	XI Vol
HPCI-1-014-001	B-J	B9.11	R1.11	XI Vol
HPCI-1-014-002	B-J	B9.11	R1.11	XI Vol
HPCI-1-014-003	C-F-2	C5.51	R1.11	XI Vol
THPCI-1-7	C-F-2	C5.51	R1.11	XI Vol
THPCI-1-22	C-F-2	C5.51	R1.11	XI Vol
THPCI-1-23	C-F-2	C5.51	R1.11	XI Vol
HPCI-019-005	C-F-2	C5.51	R1.11	XI Vol
THPCI-1-38D	C-F-2	C5.51	R1.11	XI Vol
THPCI-1-40A	C-F-2	C5.51	R1.11	XI Vol
THPCI-1-40C	C-F-2	C5.51	R1.11	XI Vol
THPCI-1-40D	C-F-2	C5.51	R1.11	XI Vol
THPCI-1-40L	C-F-2	C5.51	R1.11	XI Vol
DRHR-1-3B	B-J	B9.11	R1.16	VT-2
RHR-1-013-001	B-J	B9.11	R1.16	IGSCC Vol
RHR-1-013-002	B-J	B9.11	R1.16	IGSCC Vol
DRHR-1-13B	B-J	B9.11	R1.16	VT-2
CS-1-002-033A	B-J	B9.11	R1.16	IGSCC Vol
IGSCC Category A				
CS-1-002-019	B-J	B9.11	N/A	IGSCC Vol
CS-1-W002-020	B-F	B5.10	N/A	IGSCC Vol
CS-1-002-030	B-J	B9.11	N/A	IGSCC Vol
RWR-1-001-003	B-J	B9.11	N/A	IGSCC Vol
RWR-1-001-006	B-J	B9.11	N/A	IGSCC Vol
RWR-1-001-027	B-J	B9.11	N/A	IGSCC Vol
RWR-1-001-030	B-J	B9.11	N/A	IGSCC Vol
RWR-1-001-041	B-J	B9.11	N/A	IGSCC Vol
RWR-1-001-044	B-J	B9.11	N/A	IGSCC Vol
RWR-1-001-048	B-J	B9.11	N/A	IGSCC Vol
RWR-1-001-051	B-J	B9.11	N/A	IGSCC Vol
RWR-1-001-053	B-J	B9.11	N/A	IGSCC Vol
RWR-1-001-S023A	B-J	B9.31	N/A	IGSCC Vol
RWR-1-002-012	B-J	B9.11	N/A	IGSCC Vol
RWR-1-002-033	B-J	B9.11	N/A	IGSCC Vol
RWR-1-002-036	B-J	B9.11	N/A	IGSCC Vol
RWR-1-002-038	B-J	B9.11	N/A	IGSCC Vol
RWR-1-002-042	B-J	B9.11	N/A	IGSCC Vol
RWR-1-002-043	B-J	B9.11	N/A	IGSCC Vol
RWR-1-002-056	B-J	B9.11	N/A	IGSCC Vol
RWR-1-002-058	B-J	B9.11	N/A	IGSCC Vol
RWR-1-W001-066	B-F	B5.10	N/A	IGSCC Vol
RWR-1-W001-067	B-F	B5.10	N/A	IGSCC Vol
RWR-1-W001-068	B-F	B5.10	N/A	IGSCC Vol
RWR-1-W001-069	B-F	B5.10	N/A	IGSCC Vol
RWR-1-W001-071	B-F	B5.10	N/A	IGSCC Vol

Weld ID	Section XI Category	Section XI Item	RI-ISI Item	Exam Method
RWR-1-W002-026	B-F	B5.10	N/A	IGSCC Vol
RWR-1-W002-027	B-F	B5.10	N/A	IGSCC Vol
RWR-1-W002-028	B-F	B5.10	N/A	IGSCC Vol
RWR-1-W002-031	B-F	B5.10	N/A	IGSCC Vol
RWR-1-W003-001	B-F	B5.10	N/A	IGSCC Vol
RWR-1-W003-050	B-F	B5.10	N/A	IGSCC Vol
RWCU-1-001-013	B-J	B9.11	N/A	IGSCC Vol
RWCU-1-001-016	B-J	B9.11	N/A	IGSCC Vol
RWCU-1-001-018	B-J	B9.11	N/A	IGSCC Vol
RWCU-1-001-019	B-J	B9.11	N/A	IGSCC Vol
IGSCC Category C				
RCRD-1-33	B-F	B5.10	N/A	IGSCC Vol
RCRD-1-52	B-J	B9.11	N/A	IGSCC Vol
CS-1-002-008	B-J	B9.11	N/A	IGSCC Vol
RHR-1-012-001	B-J	B9.11	N/A	IGSCC Vol
RWCU-1-005-028	B-J	B9.11	N/A	IGSCC Vol
IGSCC Category D				
DRHR-1-11	C-F-1	C5.11	N/A	IGSCC Vol
DRHR-1-12	B-J	B9.11	N/A	IGSCC Vol
DRHR-1-2	C-F-1	C5.11	N/A	IGSCC Vol
DRHR-1-3	B-J	B9.11	N/A	IGSCC Vol
RWCU-1-005-006	B-J	B9.11	N/A	IGSCC Vol

Note: IGSCC Vol is a volumetric exam per NUREG-0313 capable of detecting IGSCC. Competency and weld volume requirements of NUREG-0313 apply.

VT-2 examination applies to IGSCC Category G welds that are inaccessible inside a penetration.

No approved examination relief requests apply to any of these welds.

NRC Request No. 8

On page E1-4, Section 2.2 of the submittal, it states that the inspection frequency specified in BWRVIP-75 is unaffected by this submittal except for the deviation identified in Section 3 of the submittal, which states that segment failures that could result in a large loss-of-coolant accident would be examined according to BWRVIP-75. Identify the BWRVIP-75 augmented examinations and frequency of examinations that will not be performed because of the RI-ISI program.

TVA Response

All BWRVIP-75 augmented examinations will be performed at the frequency specified in BWRVIP-75.

NRC Request No. 9

Table 3.8-1 of the submittal assigns three different types of examinations: flow accelerated corrosion (FAC), stress, and IGSCC. Are the examination methods for these examinations the same as the examination methods required by ASME Code, Section XI? Are all the FAC inspections referenced in Table 3.8-1 to be performed in the second interval?

TVA Response

The examination methods are defined in the Notes to Table 3.8-1. Examinations performed on Item R1.11 welds are volumetric examinations performed in accordance with the ASME Section XI Code. Examinations performed on Item R1.16 welds are also volumetric examinations as required by ASME Section XI Code that will be in accordance with NUREG-0313, capable of detecting IGSCC, with the exception of two welds that are inaccessible that will receive a VT-2 examination. FAC examinations will be performed on Item R1.18 locations during the second interval using the methods and frequencies as required by the BFN Unit 1 FAC Program.