

October 11, 2006

10 CFR 50.55a

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop: OWFN P1-35
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of) Docket No. 50-296
Tennessee Valley Authority)

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 3 - AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI, INSERVICE INSPECTION PROGRAM FOR THE THIRD TEN-YEAR INSPECTION INTERVAL - REQUEST FOR RELIEF 3-ISI-21, RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) (TAC NO. MC8795)

TVA submitted, by letter dated October 19, 2005, its Third Ten-Year Inservice Inspection (ISI) and System Pressure Test (SPT) Programs for Unit 3 of the Browns Ferry Nuclear Plant. The Code of record for the Third Ten-Year Interval ISI and SPT Programs is the 2001 Edition, 2003 Addenda of the ASME Boiler and Pressure Vessel Code, Section XI. The Third Ten-Year Interval began on November 19, 2005.

During its review of the BFN Unit 3 Third Ten-Year Interval Inservice Inspection Interval Program, the NRC staff identified questions, by letter dated September 15, 2006, regarding BFN Unit 3 request for relief 3-ISI-21. Request for relief 3-ISI-21 addresses TVA's proposed risk informed inservice inspection (RI-ISI) program. As a result, TVA is providing responses to the NRC questions in Enclosure 1 to this letter.

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Enclosure 2 contains lists the commitment contained in this submittal. If you have any questions, please contact me at (256) 729-2636.

Sincerely,

Original signed by:

William D. Crouch
Manager of Licensing
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Enclosure
cc: See Page 3

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Enclosures

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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 3
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
SECTION XI, INSERVICE INSPECTION (ISI) PROGRAM,
THIRD TEN-YEAR INSPECTION INTERVAL

REQUEST FOR RELIEF 3-ISI-21,
RISK INFORMED INSERVICE INSPECTION (RI-ISI) PROGRAM

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI)

(SEE ATTACHED)

ENCLOSURE 1

**TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 3
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
SECTION XI, INSERVICE INSPECTION (ISI) PROGRAM,
THIRD TEN-YEAR INSPECTION INTERVAL**

**REQUEST FOR RELIEF 3-ISI-21, EXAMINATION AND TESTING OF SNUBBERS,
RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI)**

During its review of the BFN Unit 3 Third Interval Program, the NRC staff identified questions regarding request for relief 3-ISI-21. These questions were transmitted to TVA by NRC letter dated September 15, 2006. Listed below are the specific NRC requests and the corresponding TVA responses.

NRC Request 1

On page 31 and 32 of 193 of Relief Request (RR) 3-ISI-21 dated October 19, 2005, Section 7.0 Part (1) and (2) contains the following:

Note: Class 1 (Class 2) piping welds shall be in accordance with the RI-ISI [risk-informed inservice inspection] additional examination requirements of [American Society of Mechanical Engineers (ASME)] Code Case N-577, as outlined in Section 7.12 of this program.

Section 7.12.5.4.J. states: "An evaluation shall be performed to establish when those examinations are to be conducted." Use of an evaluation to determine when a second sample expansion is to be performed is inconsistent with regulations. If flaws or relevant conditions are identified, sample expansions are to occur during the current outage in accordance with IWB-2430(b). The licensee needs to address the time frame in which sample expansions will be performed.

TVA Response to NRC Request 1

TVA will perform sample expansions during the current outage as required by IWB-2430(b). The BFN Unit 3 ISI Program (3-SI-4.6.G) will be revised to reflect this requirement.

NRC Request 2

Of the items selected for RI-ISI listed in the table included in Attachment 1, state how many are socket welds. Provide a breakdown of the examination technique to be performed on the items selected for examination, include the frequency of examination.

TVA Response to NRC Request 2

None of the items selected for RI-ISI are socket welds; however, all socket welds receive, and will continue to receive, a VT-2 examination in conjunction with the system pressure test.

The examination technique on the items selected for examination, including the frequency of examination, is provided in Attachment A of this enclosure, "Examination Technique and Frequency."

NRC Request 3

Page 61, Section 7.12.4, references Part 6 of Table R-A and 3-SI-4.6.G-A. These references are not provided. The licensee also lists ASME Code Case N-577 as part of the guidance used to develop its RI-ISI program. The staff has not endorsed the use of Code Case N-577. The licensee needs to provide the references or explain the licensee's Risk-Informed Process. The references or explanation needs to include how the program was developed, using what guidance, and explain any deviations from the referenced guidance.

TVA Response to NRC Request 3

The process used is the same as that outlined in TVA's original RI-ISI submittal transmitted by TVA letters dated April 23, October 25, and November 10, 1999, and January 18, 2000. TVA's RI-ISI program was approved by NRC's SER (TAC No. MA5355) transmitted by letter dated February 11, 2000. Attachment B of this enclosure provides an overview of the BFN Unit 3 RI-ISI process.

Code Case N-577 is listed in Regulatory Guide 1.193, "ASME Code Cases Not Approved For Use," for the following reasons:

- (1) The Code Case does not address inspection strategy for existing augmented and other inspection programs such as intergranular stress corrosion cracking (IGSCC),

flow-assisted corrosion (FAC), microbiological corrosion (MIC), and pitting.

BFN Risk-Informed ISI Program: Each system is reviewed for degradation mechanisms. Items selected for examination with degradation mechanism under these augmented programs are examined in accordance with the program as stated in Code Case 577. The other examinations of these programs are not affected by the Risk-Informed ISI Program and are still performed in accordance with that augmented program with the exception of Category A IGSSC welds which are selected in accordance with the Risk-Informed ISI Program. BFN views Risk-Informed examinations selected in augmented programs as dual credit as they are satisfying two different programs.

- (2) The Code Case does not provide system-level guidelines for change in risk evaluation to ensure that the risk from individual system failures will be kept small and dominant risk contributors will not be created.

The BFN Risk-Informed ISI Program, SPP-9.3, Plant Modifications and Engineering Change Control, requires design changes to be reviewed for Risk-Informed ISI effects and impacts during the design preparation phase. In addition, BFN evaluates dominate contributors to risk through the sensitivity studies to ensure systems/segments are not masked by the large risk contributors.

As a result, the BFN Unit 3 Risk-Informed ISI Program addresses NRC concerns with regard to Code Case N-577 and utilizing it as stated as a guide is acceptable. The BFN Unit 3 third ten-year interval RI-ISI Program is consistent with the discussion noted in the NRC February 11, 2000, SER for the BFN Unit 3 RI-ISI program for the second ten-year interval.

NRC Request 4

Page 64 addresses the Corrective Action Program. The licensee states that "For Code Piping categorized as High Safety Significance (HSS) the corrective action shall be consistent with the provision of ASME Code Section XI." Describe what corrective action measures will be used for Low Safety Significant (LSS) Code piping.

TVA Response to NRC Request 4

The corrective actions used for Low Safety Significance (LSS) Code piping are consistent with the provisions of ASME Code Section XI, Subarticles IWB-3142, and IWC-3132.

NRC Request 5

Define the smallest diameter pipe included in the scope of the RI-ISI program for Class 1 and 2 piping. Specify whether the scope included all Class 1 and 2 piping or if there was a defined minimum diameter. Provide justification for the defined scope.

TVA Response to NRC Request 5

The BFN Unit 3 RI-ISI Program scope includes all Class 1 and 2 piping. There is no defined minimum pipe diameter.

NRC Request 6

Attachment 1 to RR 3-ISI-1 indicates that the number of inspections was reduced from 100 in the second interval to 71 proposed for the third interval. Notable are reductions in examinations of Category A intergranular stress-corrosion cracking (IGSCC) susceptible piping associated with the reactor recirculation, reactor water cleanup, and core spray systems, as well as of Category C IGSCC-susceptible piping associated with the core spray system.

Tennessee Valley Authority (TVA) states on page 190 that "deletions from the previous program are entirely attributable to lower failure rates due to the implementation of the hydrogen water chemistry/noble metal injection program, with the corresponding impact on IGSCC."

Provide a description of TVA's methodology and an explanation of how the estimated reduction in the failure rates propagated through the methodology result in the significant reduction in the number of inspections for the third 10-year interval. The explanation should address the following specific questions the staff has developed based on the information provided in the submittal.

- A. Explain precisely how TVA was able to justify the deletion of each of the discontinued inspections in your proposed RI-ISI program for the third interval. For those welds in segments re-categorized from HSS to LSS, data for both the previous program and the proposed program, similar to that

provided in Enclosure 2 of TVA's response to Requests for Additional Information dated January 18, 2000, is suggested. For deleted welds in segments still considered HSS, data in the format of Table 3.8-1 of TVA's original submittal is suggested. Also, please add to this table the previous and proposed failure rate, core damage frequency (CDF), and risk reduction worth RRW data for each of these welds. If certain welds, with a previous "quantified failure rate" now have a "zero failure rate," provide documentation to demonstrate that the traditional ASME Section XI criteria are being met.

- B. It was observed that, despite the net reduction of proposed inspections, there were a few added inspections (e.g., two new intergranular stress-corrosion cracking Category C locations in the reactor recirculation system). Explain the reason for these additions.

TVA Response to NRC Request 6

- A. For the BFN RI-ISI Program revision, the entire process was repeated with the new failure rates resulting from the implementation of the hydrogen water chemistry/noble metal injection program, with a new total CDF and LERF due to piping failure calculated, and new risk reduction worth (RRW) values calculated for each segment.

In the original process, the BFN Expert Panel decided that, in addition to segments with RRW >1.005 being considered HSS, any segment with RRW \geq 1.001, and any segment whose failure could result in a large LOCA, would also be considered HSS. Due to this decision, the segments that were no longer HSS due to the decreased failure rates were still considered HSS due to the additional criteria. The new process also designated two additional segments HSS due to a higher LERF RRW when compared to the new lower total LERF. The results of the new analysis are compared to the results of the original analysis in the Attachment C of this enclosure "Segment Significance Comparison."

The failure rates for each weld were then combined with the Conditional Core Damage Probability (CCDP) and Conditional Large Early Release Probability (CLERP) of their respective segments to calculate RRW for each weld. Any weld with RRW \geq 1.001 was selected for examination. This is presented in Attachment D of this enclosure "Element Selection (Quantified RRW)."

In most cases for segments influenced by the hydrogen water chemistry/noble metal injection program, the failure rates went to zero and the segments were no longer HSS based on RRW. These segments were however designated HSS based on the expanded criteria. The welds in these segments were subject to ASME Section XI criteria (i.e., 25 percent of the total population, with no less than one examination per segment). These segments had a total population of 84 welds, and 21 were selected for examination. This is presented in Attachment E "Element Selection (Zero Failure Rate)." A portion of the decrease in weld examinations is due to the reduction in welds selected by RRW compared to those selected by this method. Another portion resulted from reduced RRW for Category A welds in segments determined to be HSS based on RRW from other welds in the segment.

- B. Two additional IGSCC Category C welds were selected for examination due to the RRW process. These Category C welds were not influenced by the hydrogen water chemistry/noble metal injection program, and retained their higher failure rates. As such, they had a higher RRW when compared to the revised total CDF. See segment 3-074-005 in Attachment D "Element Selection (Quantified RRW)."

NRC Request 7

A January 23-26, 2006 Nuclear Regulatory Commission (NRC) audit of the licensee's probabilistic risk assessments (PRAs) noted significant changes to the PRA model that can impact CDF, large early release frequency (LERF), and, ultimately, risk reduction worth. Many of these changes are described in a report from ERIN Engineering and Research, Inc. (ERIN), August 2003 (provided to the staff during this audit) which covers Levels A and B Facts and Observations from the industry peer certification of the Browns Ferry Nuclear Plant, Unit 3 (BFN3) PRA, as well as observations during a separate review by ERIN, identified as an evaluation of PER BFPER970822 R0.

Given the numerous changes to TVA's PRA, describe in more detail the process used to evaluate the impact of these changes on the current risk-ranking of the BFN3's pipe segments. As part of the description, indicate whether or not the conditional core damage probability (CCDPs) of the segments with the current PRA model were recalculated.

If TVA did perform a recalculation, provide the date, revision number, base CDF and LERF of the PRA model used for

redetermining CCDPs, Δ CDFs, or conditional CDF of the pipe segments.

If TVA did not perform a recalculation, explain why the changes made to the PRA in connection with the Facts and Observations and PER item resolutions of August 2003, do not impact the risk-ranking of BFN3's pipe segments.

TVA Response to NRC Request 7

The current EPU based Unit 3 PRA model (U3060706) incorporated some of the significant changes similar to the Unit 1 Extended Power Uprate (EPU) model (U1060616), such as thermal-hydraulic analysis resulting in revised success criteria, elimination of CRD as a high pressure injection source, human reliability analysis resulting in revised human error probabilities, etc. The Unit 3 EPU revision resulted in significant changes in the CDF and LERF values. The CDF changed from 1.91E-6 to 2.71E-6 and the LERF changed from 2.68E-7 to 3.78E-7. The current non-EPU calculation has not been revised for EPU conditions. However, the new model was reviewed for future impacts on the RI-ISI program. The conditional core damage probability (CCDPs) and RRWs were re-calculated. Preliminary results show minor changes in the High Safety Significance (HSS) segments. Several other segments changed from Low to Medium category. The changes in the segments significance due to EPU conditions will not be factored in the RI-ISI program until the implementation of EPU and subsequent inspection. This is consistent with NEI 04-05, "Living Program Guidance to Maintain Risk-Informed Inservice Inspection Programs For Nuclear Plant Piping Systems," Section 4.2, Periodic Reviews, and BFN's implementing surveillance instruction 3-SI-4.6.G, Section 7.12.5, Living Program.

NRC Request 8

The above audit (Agencywide Documents Access and Management System Accession number ML060440588) assessed that the significant changes to the PRA model fit the definition of a PRA upgrade as defined in Section 2 of the ASME PRA standard. The audit also identified a lack of peer review of this upgrade, which is contrary to the guidance in the ASME PRA standard. The audit also identified a lack of peer review of this upgrade, which is contrary to the guidance in the ASME PRA standard, Section 5.4, and reinforced by NRC Regulatory Guide 1.200 (page 1.200-49).

Since a peer review has not been conducted, provide the following information:

- A. A description of the review processes TVA employed in conjunction with the upgrades to the PRA models. Along with this, describe the level of expertise of the reviewers.
- B. An evaluation of the impact of the non-EPU related modeling errors specifically noted in Section 3.8 of the audit report (also documented in the BFN3 Corrective Action Program as Problem Evaluation Report (PER) No. 96035) on the RI-ISI application. In other words, if these errors are corrected, what impact will this have on the relative importance of BFN3's pipe segments?

TVA Response to NRC Request 8

- A. The audit in question was primarily intended for the Unit 1 EPU model. The Unit 1 model is currently being reviewed by industry and utility PRA experts using the ASME RA-S-2002 standard and other NEI and NRC guidance documents. Based on the peer review and their observations, appropriate changes will be made to the Unit 1 model. Any impacts on the Units 2 and 3 model will be addressed in accordance with the BFN corrective action program.
- B. BFN PER 96035 documented an error that no Human Reliability Analysis (HRA) considerations were identified for Units 2 and 3 to reflect EPU conditions. Based on our review, significant aspects of the HRA in the Units 2 and 3 model were revised to address EPU conditions (e.g., operator timing of early actions, emergency depressurization, etc.). As stated in TVA's response to NRC request number 7 above, the changes in segment significance due to EPU conditions will not be factored into the Unit 3 RI-ISI program until the implementation of EPU and subsequent inspections.

ATTACHMENT A

**BFN UNIT 3
RISK INFORMED ISI PROGRAM**

**REQUEST FOR RELIEF 3-ISI-21,
RAI RESPONSE**

EXAMINATION TECHNIQUE AND FREQUENCY

BFN Unit 3, RI-ISI Program Examination Technique And Frequency

Examinations					
Segment	Plant ID	Deg Mode	Item #	Exam	Freq
3-001-002	DSAS-3-03	Stress	R1.11	XI Vol	Interval
3-001-036	FAC locations	FAC	R1.18	Note 1	Note 2
3-001-037	FAC locations	FAC	R1.18	Note 1	Note 2
3-001-038	FAC locations	FAC	R1.18	Note 1	Note 2
3-001-039	FAC locations	FAC	R1.18	Note 1	Note 2
3-001-046	DSMS-3-15	Stress	R1.11	XI Vol	Interval
3-003-006	FAC locations	FAC	R1.18	Note 1	Note 2
3-003-007	FAC locations	FAC	R1.18	Note 1	Note 2
3-003-008	GFW-3-02	Thermal	R1.11	XI Vol	Interval
3-003-009	GFW-3-19	Thermal	R1.11	XI Vol	Interval
3-003-009	FAC locations	FAC	R1.18	Note 1	Note 2
3-003-036	FAC locations	FAC	R1.18	Note 1	Note 2
3-003-037	FAC locations	FAC	R1.18	Note 1	Note 2
3-003-038	FAC locations	FAC	R1.18	Note 1	Note 2
3-003-039	FAC locations	FAC	R1.18	Note 1	Note 2
3-003-040	FAC locations	FAC	R1.18	Note 1	Note 2
3-003-041	FAC locations	FAC	R1.18	Note 1	Note 2
3-003-042	FAC locations	FAC	R1.18	Note 1	Note 2
3-003-043	FAC locations	FAC	R1.18	Note 1	Note 2
3-068-001	GR-3-53(OL)	IGSCC-E	R1.16	IGSCC Vol	Interval
3-068-002	KR-3-02	IGSCC-C	R1.16	IGSCC Vol	Interval
	GR-3-03(OL)	IGSCC-E	R1.16	IGSCC Vol	Interval
3-068-003	RWR-3-001-G019	IGSCC-A	R1.16	IGSCC Vol	Interval
3-068-004	RWR-3-001-G016	IGSCC-A	R1.16	IGSCC Vol	Interval
3-068-005	RWR-3-001-G006	IGSCC-A	R1.16	IGSCC Vol	Interval
3-068-006	RWR-3-001-G007	IGSCC-A	R1.16	IGSCC Vol	Interval
3-068-007	RWR-3-001-G012	IGSCC-A	R1.16	IGSCC Vol	Interval
3-068-008	RWR-3-001-G015	IGSCC-A	R1.16	IGSCC Vol	Interval
3-068-009	RWR-3-002-G023	IGSCC-A	R1.16	IGSCC Vol	Interval
3-068-010	RWR-3-002-G022	IGSCC-A	R1.16	IGSCC Vol	Interval
3-068-011	RWR-3-002-G007	IGSCC-A	R1.16	IGSCC Vol	Interval
3-068-012	RWR-3-002-G018	IGSCC-A	R1.16	IGSCC Vol	Interval
3-068-013	RWR-3-002-G003	IGSCC-A	R1.16	IGSCC Vol	Interval
3-068-014	KR-3-24	IGSCC-C	R1.16	IGSCC Vol	Interval
	GR-3-27(OL)	IGSCC-E	R1.16	IGSCC Vol	Interval
3-068-015	RWR-3-002-G019	IGSCC-A	R1.16	IGSCC Vol	Interval

Segment	Plant ID	Deg Mode	Item #	Exam	Freq
3-068-016	GR-3-63	IGSCC-E	R1.16	IGSCC Vol	6 year
	GR-3-59(OL)	IGSCC-E	R1.16	IGSCC Vol	Interval
	GR-3-60(OL)	IGSCC-E	R1.16	IGSCC Vol	Interval
	GR-3-64(OL)	IGSCC-E	R1.16	IGSCC Vol	Interval
3-069-001	RWCU-3-001-G026	IGSCC-A	R1.16	IGSCC Vol	Interval
3-069-003	RWCU-3-007-G004	Thermal	R1.11	XI Vol	Interval
3-071-011	TRCIC-3-061	Stress	R1.11	XI Vol	Interval
3-073-001	THPCI-3-073A	Stress	R1.11	XI Vol	Interval
3-073-002	THPCI-3-107	Stress	R1.11	XI Vol	Interval
	THPCI-3-109	Stress	R1.11	XI Vol	Interval
3-074-005	DRHR-3-03B	IGSCC-G	R1.16	VT-2	Cycle
	DSRHR-3-01	IGSCC-C	R1.16	IGSCC Vol	Interval
	DRHR-3-04	IGSCC-C	R1.16	IGSCC Vol	Interval
	RHR-3-002-G003	Thermal	R1.11	XI Vol	Interval
3-074-007	DRHR-3-19	Thermal	R1.11	XI Vol	Interval
	DRHR-3-21	IGSCC-C	R1.16	IGSCC Vol	Interval
	DSRHR-3-08	IGSCC-C	R1.16	IGSCC Vol	Interval
	DSRHR-3-10	IGSCC-C	R1.16	IGSCC Vol	Interval
	DSRHR-3-11(OL)	IGSCC-E	R1.16	IGSCC Vol	Alt cycle
TRHR-3-191	IGSCC-C	R1.16	IGSCC Vol	Interval	
3-074-009	TRHR-3-293	Stress	R1.11	XI Vol	Interval
3-074-010	DRHR-3-12	IGSCC-D	R1.16	IGSCC Vol	6 year
3-074-013	DRHR-3-13B	IGSCC-G	R1.16	VT-2	Cycle
	DRHR-3-13	IGSCC-C	R1.16	IGSCC Vol	Interval
	DSRHR-3-05A	IGSCC-C	R1.16	IGSCC Vol	Interval
	RHR-3-002-G001	Thermal	R1.11	XI Vol	Interval
3-074-027	TRHR-3-246	Stress	R1.11	XI Vol	Interval
3-074-029	TRHR-3-222	Stress	R1.11	XI Vol	Interval
3-074-031	TRHR-3-281	Stress	R1.11	XI Vol	Interval
3-075-001	DSCS-3-07	IGSCC-C	R1.16	IGSCC Vol	Interval
	DSCS-3-08	IGSCC-C	R1.16	IGSCC Vol	Interval
	DSCS-3-09	Thermal	R1.11	XI Vol	Interval
3-075-002	DCS-3-04	IGSCC-C	R1.16	IGSCC Vol	Interval
	DSCS-3-01	IGSCC-C	R1.16	IGSCC Vol	Interval
	DSCS-3-02	IGSCC-C	R1.16	IGSCC Vol	Interval

Notes:

Note 1 Examination to be performed per FAC program.

Note 2 Examinations to be scheduled per the FAC program. This schedule is a function of previous exam results and predicted wear rate.

IGSCC Vol Volumetric examination per NUREG-0313 capable of detecting IGSCC. Competency requirements of NUREG-0313 are applicable.

XI Vol Volumetric examination per Section XI of the Boiler and Pressure Vessel Code as implemented by 2-SI-4.6.G.

Interval Examined once per ten-year interval per the requirements of Section XI and the requirements of VIP-075 for IGSCC Category A, C, and E overlay welds.

6 year Examined every six year per the requirements of VIP-075 for IGSCC Category D and E stress improved welds.

Cycle Examined every cycle per the requirements of VIP-075 for IGSCC Category G welds.

Examinations shall be scheduled such that the requirements of IWB-2412 of Section XI are satisfied.

ATTACHMENT B

**BFN UNIT 3
RISK INFORMED ISI PROGRAM**

**REQUEST FOR RELIEF 3-ISI-21,
RAI RESPONSE**

Unit 3 RISK-INFORMED ISI PROCESS

BFN UNIT 3 RISK-INFORMED ISI PROCESS

The processes used to develop the RI-ISI program are consistent with the methodology described in ASME Section XI, Code Case N-577 and WCAP-14572, Revision 1, as modified by the September 30, 1998, letter to the NRC from the Westinghouse Owners Group, with the deviations listed below. TVA addresses the NRC objections to Code Case N-577 in its response to NRC request number three in this enclosure.

The process that is being 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

Deviations from the process described in WCAP-14572 are as follows:

Calculation of Failure Rate

WCAP-14572 uses the Westinghouse Structural Reliability and Risk Assessment Model (SRRA) to calculate failure rates. TVA uses WinPRAISE, a Microsoft Windows based version of the PRAISE code used as the benchmark for SRRA in WCAP-14572 Supplement 1.

Determination of Failure Rate for a Segment

In the WCAP process, one or more points deemed most susceptible to a postulated failure mechanism were selected for each segment, and a failure rate calculated for that point or points. If more than one point was calculated, the worst result was used to determine segment risk. At TVA, failure rates were quantified for the individual elements in a segment, and the highest individual failure rate was used to determine segment risk.

Uncertainty Analysis

In paragraph 3.6.1 of the WCAP reference is made to uncertainty analyses to address uncertainty in failure probabilities and consequence. As modified by the WOG letter of September 30, 1998,

it states that a simplified uncertainty analysis should also be performed to ensure that no low safety significant segments could move into the high safety significance category when reasonable variations are considered. As a practice, the TVA Expert Panel considered all segments in this significance range ($1.005 > \text{Risk Reduction Worth (RRW)} > 1.001$) to be High Safety Significant, in lieu of performing the sensitivity study.

Structural Element Selection

In WCAP-14572, selection of elements in Region 2 of the Structural Element Selection Matrix shown in Figure 3.7-1 of the WCAP is determined by a statistical evaluation process. According to paragraph 3.7.2 of the WCAP, this statistical model is used to ensure that an acceptable level of reliability is achieved. At TVA, two methods were used to select elements in Region 2. For those elements with a quantified failure rate, that failure rate was used to select the elements. For some elements, the calculated failure rate was zero. As stated in 3.7.5 of the WCAP (as modified by the WOG letter of September 30, 1998) additional rationale must be developed when a statistical model cannot be applied to determine the minimum number of examination locations for a given segment. Since a calculated failure probability is a necessary input to a statistical evaluation, an alternative which would provide assurance of an acceptable level of reliability was used. The existing examination requirements of Section XI have provided such an acceptable level; therefore, the existing Section XI criteria were used; i.e., 25% for Class 1 and 7.5% for Class 2.

ATTACHMENT C

**BFN UNIT 3
RISK INFORMED ISI PROGRAM**

**REQUEST FOR RELIEF 3-ISI-21,
RAI RESPONSE**

SEGMENT SIGNIFICANCE COMPARISON

Segment Significance Comparison

Segment Safety Significance												
Original					Interval 3 Revision							
Segment	Segment CDF	CDF RRW	Segment LERF	LERF RRW	Safety Significance	Reason	Segment CDF	CDF RRW	Segment LERF	LERF RRW	Safety Significance	Reason
3-001-036	5.65E-08	1.005	1.58E-08	1.000	HSS	CDF RRW > 1.005	2.95E-08	1.013	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-001-037	5.65E-08	1.005	1.58E-08	1.000	HSS	CDF RRW > 1.005	2.95E-08	1.013	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-001-038	5.65E-08	1.005	1.58E-08	1.000	HSS	CDF RRW > 1.005	2.95E-08	1.013	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-001-039	5.65E-08	1.005	1.58E-08	1.000	HSS	CDF RRW > 1.005	2.95E-08	1.013	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-003-006	5.65E-08	1.005	1.58E-08	1.000	HSS	CDF RRW > 1.005	2.95E-08	1.013	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-003-007	5.65E-08	1.005	1.58E-08	1.000	HSS	CDF RRW > 1.005	2.95E-08	1.013	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-003-009	1.02E-08	1.000	2.86E-09	1.000	LSS	n/a	3.28E-09	1.001	1.92E-10	1.008	HSS	LERF RRW > 1.005
3-003-036	5.65E-08	1.005	1.58E-08	1.000	HSS	CDF RRW > 1.005	2.95E-08	1.013	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-003-037	5.65E-08	1.005	1.58E-08	1.000	HSS	CDF RRW > 1.005	2.95E-08	1.013	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-003-038	5.65E-08	1.005	1.58E-08	1.000	HSS	CDF RRW > 1.005	2.95E-08	1.013	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-003-039	5.65E-08	1.005	1.58E-08	1.000	HSS	CDF RRW > 1.005	2.95E-08	1.013	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-003-040	5.65E-08	1.005	1.58E-08	1.000	HSS	CDF RRW > 1.005	2.95E-08	1.013	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-003-041	5.65E-08	1.005	1.58E-08	1.000	HSS	CDF RRW > 1.005	2.95E-08	1.013	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-003-042	5.65E-08	1.005	1.58E-08	1.000	HSS	CDF RRW > 1.005	2.95E-08	1.013	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-003-043	5.65E-08	1.005	1.58E-08	1.000	HSS	CDF RRW > 1.005	2.95E-08	1.013	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-068-001	2.80E-07	1.025	0.00E+00	1.000	HSS	CDF RRW > 1.005	4.15E-09	1.002	0.00E+00	1.000	HSS	Defense in Depth CDF RRW ≥ 1.001
3-068-002	2.68E-08	1.002	3.08E-09	1.000	HSS	Defense in Depth CDF RRW ≥ 1.001	1.11E-10	1.000	7.42E-13	1.000	HSS	Defense in Depth Large LOCA
3-068-003	0.00E+00	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA	0.00E+00	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA
3-068-004	1.52E-08	1.001	4.25E-09	1.001	HSS	Defense in Depth CDF RRW ≥ 1.001	0.00E+00	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA

Interval 3 Revision												
Original					Interval 3 Revision							
Segment	Segment CDF	CDF RRW	Segment LERF	LERF RRW	Safety Significance	Reason	Segment CDF	CDF RRW	Segment LERF	LERF RRW	Safety Significance	Reason
3-068-005	1.82E-07	1.016	5.09E-08	1.014	HSS	CDF RRW > 1.005	0.00E+00	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA
3-068-006	6.57E-07	1.060	1.84E-07	1.052	HSS	CDF RRW > 1.005	0.00E+00	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA
3-068-007	3.86E-07	1.034	1.08E-07	1.030	HSS	CDF RRW > 1.005	0.00E+00	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA
3-068-008	1.66E-07	1.015	4.64E-08	1.013	HSS	CDF RRW > 1.005	0.00E+00	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA
3-068-009	7.48E-09	1.000	2.09E-09	1.000	HSS	Defense in Depth Large LOCA	0.00E+00	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA
3-068-010	1.54E-07	1.013	4.31E-08	1.012	HSS	CDF RRW > 1.005	0.00E+00	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA
3-068-011	5.66E-07	1.051	1.59E-07	1.044	HSS	CDF RRW > 1.005	0.00E+00	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA
3-068-012	4.59E-07	1.041	1.29E-07	1.036	HSS	CDF RRW > 1.005	0.00E+00	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA
3-068-013	4.03E-07	1.036	1.13E-07	1.031	HSS	CDF RRW > 1.005	0.00E+00	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA
3-068-014	3.20E-09	1.000	8.95w-10	1.000	HSS	Defense in Depth Large LOCA	1.12E-10	1.000	7.58E-13	1.000	HSS	Defense in Depth Large LOCA
3-068-015	0.00E+00	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA	0.00E+00	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA
3-068-016	2.83E-08	1.002	0.00E+00	1.000	HSS	Defense in Depth CDF RRW \geq 1.001	1.44E-10	1.000	0.00E+00	1.000	HSS	Defense in Depth CDF RRW \geq 1.001
3-069-001	1.52E-06	1.151	4.25E-07	1.000	HSS	CDF RRW > 1.005	2.34E-09	1.001	0.00E+00	1.000	HSS	Defense in Depth CDF RRW \geq 1.001
3-073-001	2.82E-09	1.000	8.84E-12	1.000	HSS	Defense in Depth Large LOCA	7.56E-11	1.000	0.00E+00	1.000	HSS	Defense in Depth Large LOCA

Interval 3 Revision												
Original					Interval 3 Revision							
Segment	Segment CDF	CDF RRW	Segment LERF	LERF RRW	Safety Significance	Reason	Segment CDF	CDF RRW	Segment LERF	LERF RRW	Safety Significance	Reason
3-074-005	6.13E-08	1.005	1.72E-08	1.005	HSS	CDF RRW > 1.005	1.14E-07	1.051	7.73E-10	1.032	HSS	CDF RRW > 1.005
3-074-007	1.17E-06	1.112	1.63E-07	1.046	HSS	CDF RRW > 1.005	3.61E-07	1.182	0.00E+00	1.000	HSS	CDF RRW > 1.005
3-074-010	8.48E-09	1.000	2.37E-09	1.000	LSS	<i>n/a</i>	5.75E-10	1.000	7.53E-11	1.003	HSS	Defense in Depth LERF RRW \geq 1.001
3-074-013	5.17E-07	1.047	1.45E-07	1.040	HSS	CDF RRW > 1.005	4.33E-07	1.226	2.89E-09	1.1314	HSS	CDF RRW > 1.005
3-075-001	1.55E-06	1.154	4.34E-07	1.132	HSS	CDF RRW > 1.005	9.18E-08	1.041	2.70E-09	1.122	HSS	CDF RRW > 1.005
3-075-002	2.39E-06	1.260	6.70E-07	1.219	HSS	CDF RRW > 1.005	9.17E-07	1.641	1.77E-08	3.492	HSS	CDF RRW > 1.005

ATTACHMENT D

**BFN UNIT 3
RISK INFORMED ISI PROGRAM**

**REQUEST FOR RELIEF 3-ISI-21,
RAI RESPONSE**

ELEMENT SELECTION (QUANTIFIED RRW)

ELEMENT SELECTION (QUANTIFIED RRW)

Segment	Element	P(f)	CCDP	CLERP	CDF	LERF	RRW CDF	RRW LERF	MAX RRW	Status
3-001-036	FAC areas per program	5.81E-05	5.07E-04	0.00E+00	2.95E-08	0.00E+00	1.0127	1.0000	1.0127	Selected
3-001-037	FAC areas per program	5.81E-05	5.07E-04	0.00E+00	2.95E-08	0.00E+00	1.0127	1.0000	1.0127	Selected
3-001-038	FAC areas per program	5.81E-05	5.07E-04	0.00E+00	2.95E-08	0.00E+00	1.0127	1.0000	1.0127	Selected
3-001-039	FAC areas per program	5.81E-05	5.07E-04	0.00E+00	2.95E-08	0.00E+00	1.0127	1.0000	1.0127	Selected
3-003-006	FAC areas per program	5.81E-05	5.07E-04	0.00E+00	2.95E-08	0.00E+00	1.0127	1.0000	1.0127	Selected
3-003-007	FAC areas per program	5.81E-05	5.07E-04	0.00E+00	2.95E-08	0.00E+00	1.0127	1.0000	1.0127	Selected
3-003-009	FAC areas per program	5.81E-05	5.64E-05	3.30E-06	3.28E-09	1.92E-10	1.0014	1.0078	1.0078	Selected
3-003-036	FAC areas per program	5.81E-05	5.07E-04	0.00E+00	2.95E-08	0.00E+00	1.0127	1.0000	1.0127	Selected
3-003-037	FAC areas per program	5.81E-05	5.07E-04	0.00E+00	2.95E-08	0.00E+00	1.0127	1.0000	1.0127	Selected
3-003-038	FAC areas per program	5.81E-05	5.07E-04	0.00E+00	2.95E-08	0.00E+00	1.0127	1.0000	1.0127	Selected
3-003-039	FAC areas per program	5.81E-05	5.07E-04	0.00E+00	2.95E-08	0.00E+00	1.0127	1.0000	1.0127	Selected
3-003-040	FAC areas per program	5.81E-05	5.07E-04	0.00E+00	2.95E-08	0.00E+00	1.0127	1.0000	1.0127	Selected
3-003-041	FAC areas per program	5.81E-05	5.07E-04	0.00E+00	2.95E-08	0.00E+00	1.0127	1.0000	1.0127	Selected
3-003-042	FAC areas per program	5.81E-05	5.07E-04	0.00E+00	2.95E-08	0.00E+00	1.0127	1.0000	1.0127	Selected
3-003-043	FAC areas per program	5.81E-05	5.07E-04	0.00E+00	2.95E-08	0.00E+00	1.0127	1.0000	1.0127	Selected
3-068-001	KR-3-49	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-001	GR-3-57(OL)	6.15E-08	4.69E-04	0.00E+00	2.88E-11	0.00E+00	1.0000	1.0000	1.0000	--
3-068-001	GR-3-58	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--

ELEMENT SELECTION (QUANTIFIED RRW)

Segment	Element	P(f)	CCDP	CLERP	CDF	LERF	RRW CDF	RRW LERF	MAX RRW	Status
3-068-001	KR-3-47	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-001	KR-3-48	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-001	GR-3-56	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-001	KR-3-46	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-001	GR-3-54(OL)	2.31E-07	4.69E-04	0.00E+00	1.08E-10	0.00E+00	1.0000	1.0000	1.0000	--
3-068-001	GR-3-55	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-001	KR-3-45	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-001	N1A-SE	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-001	GR-3-53(OL)	8.85E-06	4.69E-04	0.00E+00	4.15E-09	0.00E+00	1.0018	1.0000	1.0018	Selected
3-068-002	GR-3-04	0.00E+00	5.80E-04	3.86E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-002	GR-3-07	0.00E+00	5.80E-04	3.86E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-002	GR-3-01	0.00E+00	5.80E-04	3.86E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-002	GR-3-02	0.00E+00	5.80E-04	3.86E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-002	KR-3-01	0.00E+00	5.80E-04	3.86E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-002	GR-3-03(OL)	1.92E-07	5.80E-04	3.86E-06	1.11E-10	7.41E-13	1.0000	1.0000	1.0000	--
3-068-002	RWR-3-001-G025	0.00E+00	5.80E-04	3.86E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-002	KR-3-02	0.00E+00	5.80E-04	3.86E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-002	KR-3-04	0.00E+00	5.80E-04	3.86E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--

ELEMENT SELECTION (QUANTIFIED RRW)

Segment	Element	P(f)	CCDP	CLERP	CDF	LERF	RRW CDF	RRW LERF	MAX RRW	Status
3-068-002	SW-TPR-3-19	0.00E+00	5.80E-04	3.86E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-014	GR-3-30	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-014	GR-3-33	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-014	GR-3-28	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-014	RWR-3-02-G025	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-014	GR-3-27(OL)	1.92E-07	5.83E-04	3.95E-06	1.12E-10	7.58E-13	1.0000	1.0000	1.0000	--
3-068-014	KR-3-26	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-014	KR-3-24	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-014	GR-3-29	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-014	KR-3-23	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-014	SW-TPR-3-21	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-016	GR-3-63A	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-016	GR-3-61	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-016	GR-3-59(OL)	2.31E-09	4.69E-04	0.00E+00	1.08E-12	0.00E+00	1.0000	1.0000	1.0000	--
3-068-016	N1B-SE	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-016	GR-3-62	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-016	GR-3-63	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-068-016	KR-3-51	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--

ELEMENT SELECTION (QUANTIFIED RRW)

Segment	Element	P(f)	CCDP	CLERP	CDF	LERF	RRW CDF	RRW LERF	MAX RRW	Status
3-068-016	GR-3-60(OL)	3.08E-07	4.69E-04	0.00E+00	1.44E-10	0.00E+00	1.000 1	1.000 0	1.000 1	--
3-068-016	KR-3-50	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-068-016	KR-3-52	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-068-016	GR-3-64(OL)	2.42E-07	4.69E-04	0.00E+00	1.13E-10	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-068-016	GR-3-63B	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-068-016	KR-3-53	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-069-001	RWCU-3-001-043	0.00E+00	5.08E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-069-001	RWCU-3-001-G020	0.00E+00	5.08E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-069-001	RWCU-3-001-G014	0.00E+00	5.08E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-069-001	RWCU-3-001-G015	0.00E+00	5.08E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-069-001	RWCU-3-001-066	0.00E+00	5.08E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-069-001	RWCU-3-001-G016	0.00E+00	5.08E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-069-001	RWCU-3-001-G017	0.00E+00	5.08E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-069-001	RWCU-3-001-G018	0.00E+00	5.08E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-069-001	RWCU-3-001-G019	0.00E+00	5.08E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-069-001	RWCU-3-001-044	0.00E+00	5.08E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-069-001	RWCU-3-001-G024	0.00E+00	5.08E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-069-001	RWCU-3-001-G025	0.00E+00	5.08E-04	0.00E+00	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--

ELEMENT SELECTION (QUANTIFIED RRW)

Segment	Element	P(f)	CCDP	CLERP	CDF	LERF	RRW CDF	RRW LERF	MAX RRW	Status
3-069-001	RWCU-3-001-G026	4.62E-06	5.08E-04	0.00E+00	2.35E-09	0.00E+00	1.0010	1.0000	1.0010	Selected
3-074-005	DRHR-3-05	3.13E-07	5.83E-04	3.95E-06	1.82E-10	1.24E-12	1.0001	1.0000	1.0001	--
3-074-005	DRHR-3-06	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-005	DRHR-3-07	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-005	DSRHR-3-02	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-005	DSRHR-3-03	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-005	DRHR-3-03B	1.96E-04	5.83E-04	3.95E-06	1.14E-07	7.74E-10	1.0512	1.0323	1.0512	Selected
3-074-005	DSRHR-3-01	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-005	DRHR-3-04	5.11E-05	5.83E-04	3.95E-06	2.98E-08	2.02E-10	1.0129	1.0082	1.0129	Selected
3-074-005	DSRHR-3-04A	6.03E-07	5.83E-04	3.95E-06	3.52E-10	2.38E-12	1.0001	1.0001	1.0001	--
3-074-005	DSRHR-3-04	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-005	RHR-3-002-G004	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-005	RHR-3-002-G003	0.00E+00	5.83E-04	3.95E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-007	DRHR-3-22	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-007	DRHR-3-23	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-007	DRHR-3-19	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-007	DSRHR-3-09	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-007	DSRHR-3-08	7.96E-05	4.69E-04	0.00E+00	3.73E-08	0.00E+00	1.0162	1.0000	1.0162	Selected

ELEMENT SELECTION (QUANTIFIED RRW)

Segment	Element	P(f)	CCDP	CLERP	CDF	LERF	RRW CDF	RRW LERF	MAX RRW	Status
3-074-007	DRHR-3-21	1.38E-04	4.69E-04	0.00E+00	6.47E-08	0.00E+00	1.0284	1.0000	1.0284	Selected
3-074-007	DSRHR-3-10	7.69E-04	4.69E-04	0.00E+00	3.61E-07	0.00E+00	1.1817	1.0000	1.1817	Selected
3-074-007	DSRHR-3-11(OL)	1.97E-04	4.69E-04	0.00E+00	9.24E-08	0.00E+00	1.0410	1.0000	1.0410	Selected
3-074-007	TRHR-3-191	3.00E-04	4.69E-04	0.00E+00	1.41E-07	0.00E+00	1.0638	1.0000	1.0638	Selected
3-074-007	TRHR-3-193	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-007	TRHR-3-192	0.00E+00	4.69E-04	0.00E+00	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-010	DRHR-3-12	4.87E-05	1.18E-05	1.55E-06	5.75E-10	7.55E-11	1.0002	1.0031	1.0031	Selected
3-074-013	DRHR-3-15	0.00E+00	5.80E-04	3.86E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-013	DRHR-3-16	0.00E+00	5.80E-04	3.86E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-013	DSRHR-3-06	0.00E+00	5.80E-04	3.86E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-013	DRHR-3-14	6.25E-07	5.80E-04	3.86E-06	3.63E-10	2.41E-12	1.0002	1.0001	1.0002	--
3-074-013	DSRHR-3-05A	2.50E-06	5.80E-04	3.86E-06	1.45E-09	9.65E-12	1.0006	1.0004	1.0006	--
3-074-013	DRHR-3-13	1.23E-04	5.80E-04	3.86E-06	7.13E-08	4.75E-10	1.0314	1.0195	1.0314	Selected
3-074-013	DRHR-3-13B	7.47E-04	5.80E-04	3.86E-06	4.33E-07	2.88E-09	1.2265	1.1318	1.2265	Selected
3-074-013	DSRHR-3-05A	3.65E-04	5.80E-04	3.86E-06	2.12E-07	1.41E-09	1.0992	1.0603	1.0992	Selected
3-074-013	DSRHR-3-07	6.65E-07	5.80E-04	3.86E-06	3.86E-10	2.57E-12	1.0002	1.0001	1.0002	--
3-074-013	RHR-3-002-G002	0.00E+00	5.80E-04	3.86E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-074-013	RHR-3-002-G001	0.00E+00	5.80E-04	3.86E-06	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--

ELEMENT SELECTION (QUANTIFIED RRW)

Segment	Element	P(f)	CCDP	CLERP	CDF	LERF	RRW CDF	RRW LERF	MAX RRW	Status
3-075-001	01cs13hf	9.07E-08	2.26E-03	6.66E-05	2.05E-10	6.04E-12	1.0001	1.0002	1.0002	--
3-075-001	TCS-3-401	0.00E+00	2.26E-03	6.66E-05	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-075-001	TSCS-3-402	0.00E+00	2.26E-03	6.66E-05	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-075-001	TCS-3-403	4.08E-13	2.26E-03	6.66E-05	9.22E-16	2.72E-17	1.0000	1.0000	1.0000	--
3-075-001	TSCS-3-404	2.56E-13	2.26E-03	6.66E-05	5.79E-16	1.70E-17	1.0000	1.0000	1.0000	--
3-075-001	DCS-3-14	0.00E+00	2.26E-03	6.66E-05	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-075-001	DCS-3-13	0.00E+00	2.26E-03	6.66E-05	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-075-001	TCS-3-410	0.00E+00	2.26E-03	6.66E-05	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-075-001	TCS-3-406	0.00E+00	2.26E-03	6.66E-05	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-075-001	DSCS-3-07	3.57E-05	2.26E-03	6.66E-05	8.07E-08	2.38E-09	1.0356	1.1062	1.1062	Selected
3-075-001	DSCS-3-09	0.00E+00	2.26E-03	6.66E-05	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-075-001	DSCS-3-08	4.06E-05	2.26E-03	6.66E-05	9.18E-08	2.70E-09	1.0407	1.1226	1.1226	Selected
3-075-001	DCS-3-12	7.50E-16	2.26E-03	6.66E-05	1.70E-18	5.00E-20	1.0000	1.0000	1.0000	--
3-075-001	DSCS-3-16B	7.50E-16	2.26E-03	6.66E-05	1.70E-18	5.00E-20	1.0000	1.0000	1.0000	--
3-075-001	TCS-3-405	0.00E+00	2.26E-03	6.66E-05	0.00E+00	0.00E+00	1.0000	1.0000	1.0000	--
3-075-001	TSCS-3-409	1.04E-15	2.26E-03	6.66E-05	2.35E-18	6.93E-20	1.0000	1.0000	1.0000	--
3-075-001	TSCS-3-408	3.63E-15	2.26E-03	6.66E-05	8.20E-18	2.42E-19	1.0000	1.0000	1.0000	--
3-075-001	TSCS-3-407	5.70E-15	2.26E-03	6.66E-05	1.29E-17	3.80E-19	1.0000	1.0000	1.0000	--

ELEMENT SELECTION (QUANTIFIED RRW)

Segment	Element	P(f)	CCDP	CLERP	CDF	LERF	RRW CDF	RRW LERF	MAX RRW	Status
3-075-002	01cs13hf	9.07E-08	1.55E-03	3.00E-05	1.41E-10	2.72E-12	1.000 1	1.000 1	1.000 1	--
3-075-002	TCS-3-417	0.00E+00	1.55E-03	3.00E-05	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-075-002	TSCS-3-418	0.00E+00	1.55E-03	3.00E-05	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-075-002	TCS-3-419	6.36E-13	1.55E-03	3.00E-05	9.86E-16	1.91E-17	1.000 0	1.000 0	1.000 0	--
3-075-002	TSCS-3-420	9.78E-13	1.55E-03	3.00E-05	1.52E-15	2.93E-17	1.000 0	1.000 0	1.000 0	--
3-075-002	DCS-3-05	0.00E+00	1.55E-03	3.00E-05	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-075-002	DCS-3-04	4.08E-06	1.55E-03	3.00E-05	6.32E-09	1.22E-10	1.002 7	1.005 0	1.005 0	Selected
3-075-002	TCS-3-426	0.00E+00	1.55E-03	3.00E-05	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-075-002	TCS-3-422	0.00E+00	1.55E-03	3.00E-05	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-075-002	DSCS-3-02	1.44E-04	1.55E-03	3.00E-05	2.23E-07	4.32E-09	1.105 1	1.211 3	1.211 3	Selected
3-075-002	DSCS-3-01	5.90E-04	1.55E-03	3.00E-05	9.15E-07	1.77E-08	1.638 9	3.505 7	3.505 7	Selected
3-075-002	TCS-3-421	0.00E+00	1.55E-03	3.00E-05	0.00E+00	0.00E+00	1.000 0	1.000 0	1.000 0	--
3-075-002	DSCS-3-16A	7.05E-15	1.55E-03	3.00E-05	1.09E-17	2.12E-19	1.000 0	1.000 0	1.000 0	--
3-075-002	DCS-3-03	7.05E-15	1.55E-03	3.00E-05	1.09E-17	2.12E-19	1.000 0	1.000 0	1.000 0	--
3-075-002	TSCS-3-425X	1.27E-15	1.55E-03	3.00E-05	1.97E-18	3.81E-20	1.000 0	1.000 0	1.000 0	--
3-075-002	TSCS-3-423	4.57E-15	1.55E-03	3.00E-05	7.08E-18	1.37E-19	1.000 0	1.000 0	1.000 0	--
3-075-002	TSCS-3-424	8.31E-15	1.55E-03	3.00E-05	1.29E-17	2.49E-19	1.000 0	1.000 0	1.000 0	--

ATTACHMENT E

**BFN UNIT 3
RISK INFORMED ISI PROGRAM**

**REQUEST FOR RELIEF 3-ISI-21,
RAI RESPONSE**

ELEMENT SELECTION (ZERO FAILURE RATE)

ELEMENT SELECTION (ZERO FAILURE RATE)

Segment	Boundary Description	Segment Population	Selected Element(s)	Selected Population
3-068-002	28" discharge line from Recirculation pump "A" to Recirc ring header	10	GR-3-03(OL) KR-3-02	2
3-068-003	22" line Recirc ring header "A"	2	RWR-3-001-G019	1
3-068-004	12" discharge line from Recirc ring header "A" to Reactor (N2F)	4	RWR-3-001-G016	1
3-068-005	12" discharge line from Recirc ring header "A" to Reactor (N2G)	3	RWR-3-001-G006	1
3-068-006	12" discharge line from Recirc ring header "A" to Reactor (N2H)	3	RWR-3-001-G007	1
3-068-007	12" discharge line from Recirc ring header "A" to Reactor (N2J)	3	RWR-3-001-G012	1
3-068-008	12" discharge line from Recirc ring header "A" to Reactor (N2K)	4	RWR-3-001-G013	1
3-068-009	12" discharge line from Recirc ring header "B" to Reactor (N2E)	4	RWR-3-001-G023	1
3-068-010	12" discharge line from Recirc ring header "B" to Reactor (N2D)	3	RWR-3-001-G022	1
3-068-011	12" discharge line from Recirc ring header "B" to Reactor (N2C)	3	RWR-3-001-G007	1
3-068-012	12" discharge line from Recirc ring header "B" to Reactor (N2B)	3	RWR-3-001-G018	1
3-068-013	12" discharge line from Recirc ring header "B" to Reactor (N2A)	4	RWR-3-001-G003	1
3-068-014	28" discharge line from Recirculation pump "B" to Recirc ring header	10	GR-3-27(OL) KR-3-24	2
3-068-015	22" line Recirc ring header "B"	2	RWR-3-001-G019	1
3-068-016	28" suction line from Reactor (N1B) to Recirculation pump "B"	13	GR-3-60 (OL) GR-3-63, GR-3-64(OL), GR-3-59(OL)	4
3-073-001	10" supply line from 26" MS line "B" to penetration X-11	13	THPCI-3-073A	1
Total		84		21 (25%)

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 3
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
SECTION XI, INSERVICE INSPECTION (ISI) PROGRAM,
THIRD TEN-YEAR INSPECTION INTERVAL

REQUEST FOR RELIEF 3-ISI-21,
RISK INFORMED INSERVICE INSPECTION (RI-ISI) PROGRAM

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI)

COMMITMENT LIST

TVA will perform sample expansions during the current outage as required by IWB-2430(b). The BFN Unit 3 ISI Program (3-SI-4.6.G) will be revised to reflect this requirement.