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

CNL-16-072

June 10, 2016

10 CFR 50.55a

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

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

Subject: **Browns Ferry Nuclear Plant Units 2 and 3, American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI, Inservice Inspection and Augmented Programs, Unit 2 Fifth Ten Year Interval Request For Relief 2-ISI-30 and Unit 3 Fourth Ten Year Interval Request for Relief 3-ISI-27**

References:
1. NRC Letter to TVA, "Browns Ferry Nuclear Plant Unit 2, Relief Request 2-ISI-9, Alternatives for Examination of Reactor Pressure Vessel Shell Welds (TAC No. MA8424)," dated August 14, 2000 (ML003740638)
2. NRC Letter to TVA, "Browns Ferry Nuclear Plant Unit 3, Relief Request 3-ISI-1, Revision 1, Alternatives for Examination of Reactor Pressure Vessel Shell Welds (TAC No. MA5953)," dated November 18, 1999 (ML993300264)

Tennessee Valley Authority (TVA) is requesting a proposed alternative for Browns Ferry Nuclear Plant (BFN) Units 2 and 3 in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(1) on the basis that the proposed alternative provides an acceptable level of quality and safety. The proposed alternative would provide permanent relief from reactor vessel circumferential weld examinations currently required by the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section XI for the periods of extended operation ending June 28, 2034, for BFN Unit 2 and July 2, 2036, for BFN Unit 3.

Permanent relief from reactor vessel circumferential weld examinations was approved by the NRC in Reference 1 for the remaining term of the BFN Unit 2 original operating license and in Reference 2 for the remaining term of the BFN Unit 3 original operating license. The period of extended operation began June 28, 2014, for BFN Unit 2, and the period of extended operation begins July 2, 2016, for BFN Unit 3. The fifth ten-year Inservice Inspection (ISI) interval for BFN Unit 2 began February 1, 2016. The fourth ten-year ISI interval for BFN Unit 3 began February 1, 2016.

Enclosures 1 and 2 to this letter contain the BFN Unit 2, Request for Relief 2-ISI-30, and BFN Unit 3, Request for Relief 3-ISI-27, respectively, for NRC review and approval. Table 1 of each enclosure contains specific information associated with each weld for which TVA is requesting relief from reactor vessel circumferential weld examinations.

TVA requests approval of these requests for relief within one year from the date of this letter.

There are no new regulatory commitments contained in this letter. If you have any questions, please contact Jamie L. Paul at (256) 729-2636.

Respectfully,

J. W. Shea
Vice President, Nuclear Licensing

Enclosures:

1. Browns Ferry Nuclear Plant, Unit 2 Inservice Inspection and Augmented Program Fifth Ten Year Interval Request for Alternative 2-ISI-30
2. Browns Ferry Nuclear Plant, Unit 3 Inservice Inspection and Augmented Program Fourth Ten Year Interval Request for Alternative 3-ISI-27

cc (w/Enclosures):

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

Enclosure 1

Browns Ferry Nuclear Plant, Unit 2

Inservice Inspection and Augmented Program
Fifth Ten Year Interval

Request for Alternative 2-ISI-30

Tennessee Valley Authority
Browns Ferry Nuclear Plant (BFN) Unit 2
American Society of Mechanical Engineers (ASME) Section XI, Inservice Inspection (ISI) and Augmented Program Fifth Ten Year Interval Request for Alternative 2-ISI-30

I. ASME Code Components Affected:

The welds listed in Table 1 are subject to this request for alternative.

Table 1

Weld Description[1]	Category and Exam Method	Table IWB-2500-1 Item Number
Vessel Shell to Shell Weld No.C-4-5	B-A, Volumetric	B1.11
Vessel Shell to Shell Weld No. C-3-4	B-A, Volumetric	B1.11
Vessel Shell to Shell Weld No. C-2-3	B-A, Volumetric	B1.11
Vessel Shell to Shell Weld No. C-1-2 (Located in Belt-line Region)	B-A, Volumetric	B1.11
Vessel Shell to Bottom Head Weld No. C-BH-1	B-A, Volumetric	B1.11

ASME Code Class: ASME Code Class 1

Code Table: IWB 2500-1

Examination Category: B-A (Pressure Retaining Welds in Reactor Vessel)

Examination Item Number: B1.11 (Circumferential Shell Welds)

II. ASME Code Edition and Addenda:

ASME Boiler & Pressure Vessel (B&PV) Code, Section XI, 2007 Edition through 2008 Addenda

III. Applicable Code Requirement:

ASME B&PV Code Section XI, 2007 Edition with 2008 Addenda, Examination Category B-A, Pressure Retaining Welds In Reactor Vessel, Examination Category B-A, Item B1.11, Circumferential Shell Welds, requires a volumetric examination of Reactor Pressure Vessel (RPV) circumferential shell welds each interval.

[1] Vessel Shell to Flange Weld No. C-5-FLG was included in the Reference 1 request for relief but is not included in this request.

IV. Reason for Request:

TVA is requesting a proposed alternative in accordance with 10 CFR 50.55a(z)(1) on the basis that the proposed alternative provides an acceptable level of quality and safety. The proposed alternative would provide permanent relief from circumferential weld examinations currently required by ASME Code for the period of extended operation.

Permanent relief from circumferential weld examinations was approved for Unit 2 in Reference 1 for the remaining term of operation under the original operating license that expired on June 28, 2014.

The NRC technical review of the BFN Units 1, 2, and 3 license renewal application (LRA) is provided in NUREG-1843 (Reference 2). As stated in Section 4.2.6.4 (Conclusion):

> *The staff reviewed the applicant's Time-Limited Aging Analysis (TLAA) on Reactor Vessel (RV) circumferential weld examination relief, as summarized in LRA Section 4.2.6, and determined that the applicant appropriately explained that the conditional failure probabilities for the RV circumferential welds are bounded by the staff analysis in the SER on the BWRVIP-05 report, dated July 28, 1998, and that the applicant will be using procedures and training to limit cold over-pressure events during the period of extended operation for BFN.*

V. Proposed Alternative and Basis for Relief:

Permanent relief from circumferential shell weld examinations is requested for the welds listed in Table 1. The proposed relief is for the remaining term of operation under the renewed license that expires June 28, 2034.

The following information from NUREG-1843 (Section 4.2.6.2) provides the basis for use of the proposed alternative:

> *The technical basis for relief is discussed in the staff's final SER concerning the BWRVIP-05 report, enclosed in a July 28, 1998, letter from Mr. G.C. Laines (NRC) to Mr. C. Terry (BWRVIP Chairman). In this letter, the NRC concluded that since the failure frequency for RV circumferential welds in BWR plants is significantly below the criterion specified in RG 1.154, "Format and Content of Plant-Specific Pressurized Thermal Shock Safety Analysis Reports for Pressurized Water Reactors," and below the core damage frequency of any BWR plant, the continued inspection would result in a negligible decrease in an already acceptably low value of RV failure. Therefore, elimination of the inservice inspection (ISI) for RV circumferential welds was justified. The staff's letter indicated that BWR applicants may request relief from ISI requirements of 10 CFR 50.55a(g) for volumetric examination of circumferential RV welds by demonstrating that (1) at the expiration of the license, the circumferential welds satisfy the limiting conditional failure probability for circumferential welds in the staff's July 28,1998 evaluation, and (2) the applicants have implemented operator training and established procedures that limit the frequency of cold over-pressure events to the frequency specified in the staff's SER.*

V. Proposed Alternative and Basis for Relief (Continued):

The letter indicated that the requirements for inspection of circumferential RV welds during an additional 20-year license renewal period would be reassessed, on a plant-specific basis, as part of any BWR LRA. Therefore, the applicant must request relief from inspection of circumferential welds during the license renewal period per 10 CFR 50.55a.

Section A.4.5 of the BWRVIP-74 report indicates that the staff's SER of the BWRVIP-05 report conservatively evaluated the BWR RVs to 64 Effective Full Power Years (EFPY), which is 10 EFPY greater than what is realistically expected for the end of the license renewal period. The staff used the mean RT_{NDT} value for materials to evaluate failure probability of BWR circumferential welds at 32 and 64 EFPY in the staff SER dated July 28, 1998. The neutron fluence used in this evaluation was the neutron fluence at the clad-weld (inner) interface.

Since the staff analysis discussed in the BWRVIP-74 is a generic analysis, the applicant submitted plant-specific information to demonstrate that the beltline materials meet the criteria specified in the report. To demonstrate that the vessels for Unit 2 and 3 have not become embrittled beyond the basis for the relief, the applicant, in LRA Table 4.2.6.1, supplied a comparison of 52 EFPY material data for the limiting BFN circumferential welds with that of the 64 EFPY reference case in Appendix E of the staff's SER of the BWRVIP-05 report. The BFN material data includes amounts of copper and nickel, chemistry factor, the neutron fluence, delta RT_{NDT}, initial RT_{NDT}, and mean RT_{NDT} of the limiting circumferential weld at the end of the renewal period. The staff verified the data for the copper and nickel contents and the initial RT_{NDT} values for Units 2 and 3 beltline materials by comparing them with the corresponding data in the RVID maintained by the staff. The 52 EFPY mean RT_{NDT} value for Units 2 and 3 is 25 ºF. The staff checked the applicant's calculations for the 52 EFPY mean RT_{NDT} values for the circumferential welds using the data presented in LRA Table 4.2.6.1 and found them accurate. These 52 EFPY mean RT_{NDT} values for Units 2 and 3 are less than the 64 EFPY mean RT_{NDT} value of 129.4 ºF used by the staff for determining the conditional failure probability of a circumferential weld. The 64 EFPY mean RT_{NDT} value from the staff SER dated July 28, 1998, is for a Babcock and Wilcox (B&W) weld, because B&W welded the circumferential welds in the vessels. Since the BFN 52 EFPY mean RT_{NDT} values are less than the 64 EFPY value from the staff SER dated July 28, 1998, the staff concluded that the BFN RV conditional failure probabilities are bounded by the staff analysis.

V. Proposed Alternative and Basis for Relief (Continued):

The applicant stated that the procedures and training used to limit cold over-pressure events will be the same as those approved by the staff when the applicant requested relief for the current license period, but it did not explicitly cite a document that supports this statement. The applicant stated that the procedure and training requirements identified in the applicant's request to use the BWRVIP-05 report are provided in the document, "Safety Evaluation by the Office of Nuclear Reactor Regulation Related to Alternative to Inspection of Reactor Pressure Vessel Circumferential Welds, BFN Power Station, Units 2 and 3," (attached to staff letter to TVA; 'Browns Ferry Nuclear Plant Unit 2, Relief Request 2-ISI-9, Alternatives for Examination of Reactor Pressure Vessel Shell Welds (TAC No. MA8424)," August 14, 2000; and staff letter to the applicant, "Browns Ferry Nuclear Plant Unit 3, Relief Request 3-ISI-1, Revision 1, Alternatives for Examination of Reactor Pressure Vessel Shell Welds (TAC No. MA5953)," November 18, 1999. The applicant further stated that LRA Section 4.2.6, and associated LRA Section A.3.1.6, reference the safety evaluation request letters identified above. The staff found the response acceptable because the applicant identified the requested references and commits to include them in LRA Sections 4.2.6 and A.3.1.6.

Subsequent to the NRC approval of the LRA and in accordance with License Commitment 39 (NUREG-1843), revised RCS Pressure and Temperature (P/T) limit curves for BFN Unit 2 were submitted to NRC for approval (Reference 3) and subsequently approved by the NRC in License Amendment No. 314 (Reference 4).

Table 2 contains the values from Table 4.2.6.1 of the LRA and Table B-5 of Enclosure 3 from the application for the revised P/T limit curves (Reference 3). The values for the projected fluence for the limiting circumferential weld associated with the revised P/T limit curves reflects a reduced fluence for 48 EFPY compared to the projected fluence contained in the LRA for 52 EFPY.

B&W 64 EFPY data provided in Table 2 is taken from Table 2.6.5 of the Final Safety Evaluation of the BWRVIP-05 Report (Reference 5).

V. Proposed Alternative and Basis for Relief (Continued):

TABLE 2			
Group	B&W 64 EFPY	BFN Unit 2 52 EFPY (LRA Values) Shell 1 to Shell 2 Weld Heat No. D55733	BFN Unit 2 48 EFPY (Revised P/T Limit Values) Shell 1 to Shell 2 Weld Heat No.D55733
Cu %	0.31	0.09	0.09
Ni %	0.59	0.65	0.65
CF	196.7	117	117
Fluence at Clad/Weld Interface 10^{19} n/cm^2	0.19	0.19	0.156
Delta RT_{NDT} Without Margin (ºF)	109.4	65	59.9
Initial RT_{NDT} (ºF)	20	-40	-40
Mean RT_{NDT} (ºF)	129.4	25	19.9
P (F/E) NRC	4.83×10^{-4}		_____
P (F/E) BWRVIP	_____		_____

The conditional failure probability, P (F/E), for BFN Unit 2 is bounded by the conditional failure probability calculated by the NRC for the limiting B&W vessel. In the NRC's evaluation of the BWRVIP-05 report, a fluence of 0.19×10^{19} n/cm^2 for B&W RVs was used for 64 EFPY and the corresponding delta RT_{NDT} value was 109.4 ºF. The delta RT_{NDT} value for the limiting beltline weld metal of BFN Unit 2 is less than the limiting delta RT_{NDT} value in the NRC's evaluation of BWRVIP-05 report. Therefore, the calculated mean RT_{NDT} value for the limiting beltline weld metal is acceptable and meets the requirements specified in NRC's approved SER for the BWRVIP-05 report.

VI. Duration of Proposed Alternative:

This relief is requested for examinations of the reactor vessel circumferential shell welds for the remaining term of the renewed license for BFN Unit 2 that expires June 28, 2034.

VII. Precedents:

This request for alternative is consistent with Request for Relief 2-ISI-9, approved for the duration of the original BFN Unit 2 Operating License (Reference 1).

Similar relief was approved for the periods of extended operation for BFN Unit 1 (Reference 6) and for the Peach Bottom Atomic Power Station, Units 2 and 3 (Reference 7).

VIII. References:

1. NRC letter to TVA, “Browns Ferry Nuclear Plant Unit 2, Relief Request 2-ISI-9, Alternatives for Examination of Reactor Pressure Vessel Shell Welds (TAC No. MA8424),” dated August 14, 2000 (ML003740638).

2. NUREG-1843, “Safety Evaluation Report Related to the License Renewal of the Browns Ferry Nuclear Plant, Units 1, 2, and 3”

3. TVA letter to NRC, CNL-14-065, “Browns Ferry Nuclear Plant (BFN), Unit 2 – Application to Modify Technical Specification 3.4.9, “RCS Pressure and Temperature (P/T) Limits” (BFN TS-491),” dated June 19, 2014 (ML14175A307)

4. NRC letter to TVA, “Browns Ferry Nuclear Plant, Unit 2 – Issuance of Amendment Revising Pressure and Temperature Limit Curves,” dated June 2, 2015 (ML15065A049)

5. NRC letter to BWRVIP Chairman, "Final Safety Evaluation of the BWRVIP Vessel and Internals Project BWRVIP-05 Report (TAC No. M93925),” dated July 28, 1998

6. NRC letter to TVA, “Browns Ferry Nuclear Plant, Unit 1 - Alternative Relief Request 1-ISI-27 for Relief from the Reactor Vessel Circumferential Weld Examination Requirements of the ASME Code (CAC No. MF6401), dated February 17, 2016 (ML16020A115)

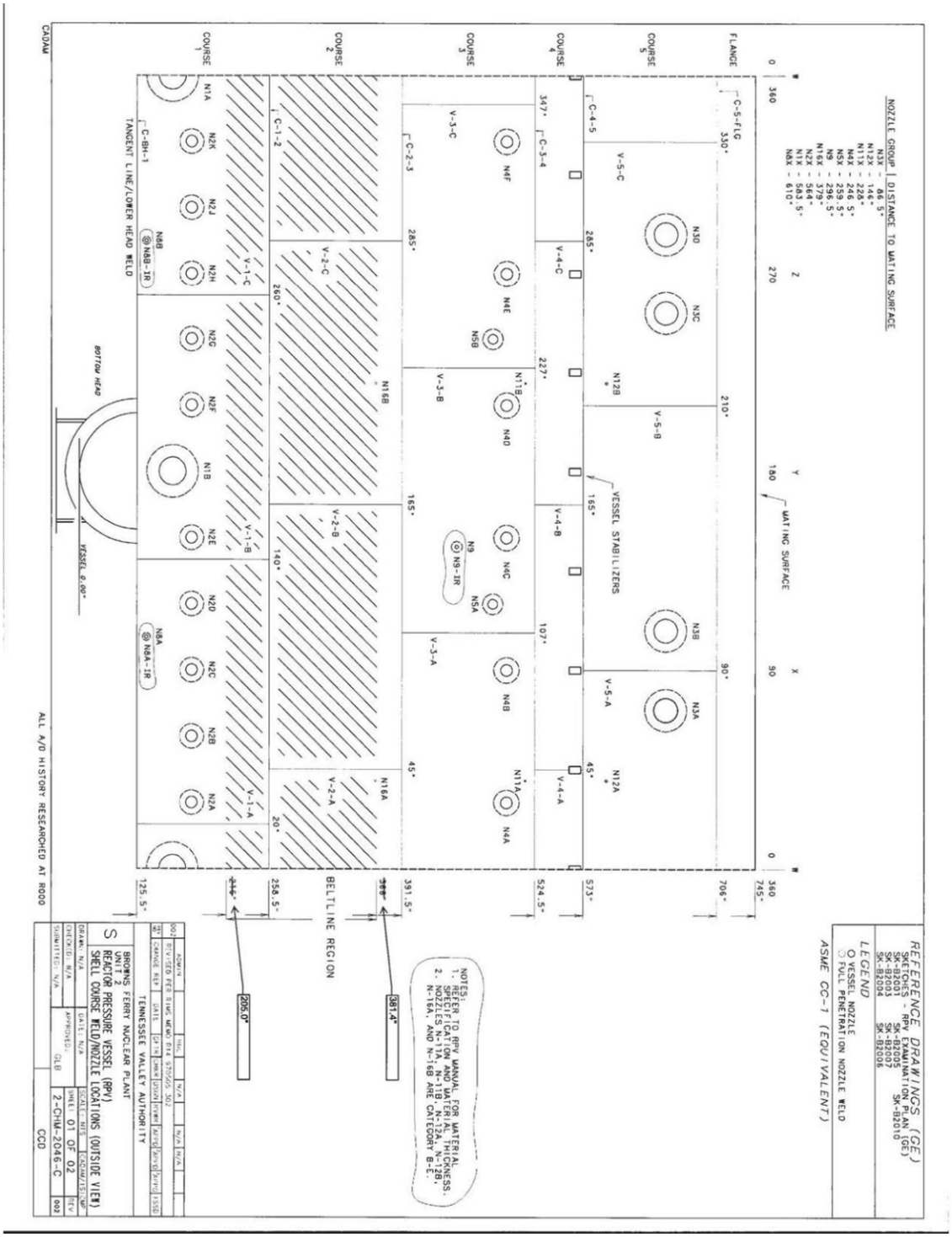
7. NRC letter to Exelon Generation Company, LLC, “Peach Bottom Atomic Power Station, Units 2 and 3 - Requests for Relief I4R-51 and I4R-52 (TAC Nos. ME5392, ME5393, ME5394 and ME5395),” dated January 24, 2012 (ML112770217)

IX. Attachment:

Browns Ferry Unit 2 RPV shell weld location schematic drawing.

Attachment

Browns Ferry Unit 2 RPV Shell Weld Location Schematic Drawing



Enclosure 2

Browns Ferry Nuclear Plant, Unit 3

Inservice Inspection and Augmented Program
Fourth Ten Year Interval

Request for Alternative 3-ISI-27

Tennessee Valley Authority
Browns Ferry Nuclear Plant (BFN) Unit 3
American Society of Mechanical Engineers (ASME) Section XI, Inservice Inspection (ISI) and Augmented Program Fourth Ten Year Interval Request for Alternative 3-ISI-27

I. ASME Code Components Affected:

The welds listed in Table 1 are subject to this request for alternative.

Table 1

Weld Description[1]	Category and Exam Method	Table IWB-2500-1 Item Number
Vessel Shell to Shell Weld No.C-4-5	B-A, Volumetric	B1.11
Vessel Shell to Shell Weld No. C-3-4	B-A, Volumetric	B1.11
Vessel Shell to Shell Weld No. C-2-3	B-A, Volumetric	B1.11
Vessel Shell to Shell Weld No. C-1-2 (Located in Belt-line Region)	B-A, Volumetric	B1.11
Vessel Shell to Bottom Head Weld No. C-BH-1	B-A, Volumetric	B1.11

ASME Code Class: ASME Code Class 1

Code Table: IWB 2500-1

Examination Category: B-A (Pressure Retaining Welds in Reactor Vessel)

Examination Item Number: B1.11 (Circumferential Shell Welds)

II. ASME Code Edition and Addenda:

ASME Boiler & Pressure Vessel (B&PV) Code, Section XI, 2007 Edition through 2008 Addenda

III. Applicable Code Requirement:

ASME B&PV Code Section XI, 2007 Edition with 2008 Addenda, Examination Category B-A, Pressure Retaining Welds In Reactor Vessel, Examination Category B-A, Item B1.11, Circumferential Shell Welds, requires a volumetric examination of RPV circumferential shell welds each interval.

[1] Vessel Shell to Flange Weld No. C-5-FLG was included in the Reference 1 request for relief but is not included in this request.

IV. Reason for Request:

TVA is requesting a proposed alternative in accordance with 10 CFR 50.55a(z)(1) on the basis that the proposed alternative provides an acceptable level of quality and safety. The proposed alternative would provide permanent relief from circumferential weld examinations currently required by ASME Code for the period of extended operation.

Permanent relief from circumferential weld examinations was approved for Unit 3 in Reference 1 for the remaining term of operation under the original operating license that expires on July 2, 2016.

The NRC technical review of the Browns Ferry Nuclear Plant(BFN) Units 1, 2, and 3 license renewal application (LRA) is provided in NUREG-1843 (Reference 2). As stated in Section 4.2.6.4 (Conclusion):

> *The staff reviewed the applicant's Time-Limited Aging Analysis (TLAA) on Reactor Vessel (RV) circumferential weld examination relief, as summarized in LRA Section 4.2.6, and determined that the applicant appropriately explained that the conditional failure probabilities for the RV circumferential welds are bounded by the staff analysis in the SER on the BWRVIP-05 report, dated July 28, 1998, and that the applicant will be using procedures and training to limit cold over-pressure events during the period of extended operation for BFN.*

V. Proposed Alternative and Basis for Relief:

Permanent relief from circumferential shell weld examinations is requested for the welds listed in Table 1. The proposed relief is for the remaining term of operation under the renewed license that expires July 2, 2036.

The following information from NUREG-1843 (Section 4.2.6.2) provides the basis for use of the proposed alternative:

> *The technical basis for relief is discussed in the staff's final SER concerning the BWRVIP-05 report, enclosed in a July 28, 1998, letter from Mr. G.C. Laines (NRC) to Mr. C. Terry (BWRVIP Chairman). In this letter, the NRC concluded that since the failure frequency for RV circumferential welds in BWR plants is significantly below the criterion specified in RG 1.154, "Format and Content of Plant-Specific Pressurized Thermal Shock Safety Analysis Reports for Pressurized Water Reactors," and below the core damage frequency of any BWR plant, the continued inspection would result in a negligible decrease in an already acceptably low value of RV failure. Therefore, elimination of the inservice inspection (ISI) for RV circumferential welds was justified. The staff's letter indicated that BWR applicants may request relief from ISI requirements of 10 CFR 50.55a(g) for volumetric examination of circumferential RV welds by demonstrating that (1) at the expiration of the license, the circumferential welds satisfy the limiting conditional failure probability for circumferential welds in the staff's July 28,1998 evaluation, and (2) the applicants have implemented operator training and established procedures that limit the frequency of cold over-pressure events to the frequency specified in the staff's SER.*

V. Proposed Alternative and Basis for Relief (Continued):

The letter indicated that the requirements for inspection of circumferential RV welds during an additional 20-year license renewal period would be reassessed, on a plant-specific basis, as part of any BWR LRA. Therefore, the applicant must request relief from inspection of circumferential welds during the license renewal period per 10 CFR 50.55a.

Section A.4.5 of the BWRVIP-74 report indicates that the staff's SER of the BWRVIP-05 report conservatively evaluated the BWR RVs to 64 Effective Full Power Years (EFPY), which is 10 EFPY greater than what is realistically expected for the end of the license renewal period. The staff used the mean RT_{NDT} value for materials to evaluate failure probability of BWR circumferential welds at 32 and 64 EFPY in the staff SER dated July 28, 1998. The neutron fluence used in this evaluation was the neutron fluence at the clad-weld (inner) interface.

Since the staff analysis discussed in the BWRVIP-74 is a generic analysis, the applicant submitted plant-specific information to demonstrate that the beltline materials meet the criteria specified in the report. To demonstrate that the vessels for Unit 2 and 3 have not become embrittled beyond the basis for the relief, the applicant, in LRA Table 4.2.6.1, supplied a comparison of 52 EFPY material data for the limiting BFN circumferential welds with that of the 64 EFPY reference case in Appendix E of the staff's SER of the BWRVIP-05 report. The BFN material data includes amounts of copper and nickel, chemistry factor, the neutron fluence, delta RT_{NDT}, initial RT_{NDT}, and mean RT_{NDT} of the limiting circumferential weld at the end of the renewal period. The staff verified the data for the copper and nickel contents and the initial RT_{NDT} values for Units 2 and 3 beltline materials by comparing them with the corresponding data in the RVID maintained by the staff. The 52 EFPY mean RT_{NDT} value for Units 2 and 3 is 25 ºF. The staff checked the applicant's calculations for the 52 EFPY mean RT_{NDT} values for the circumferential welds using the data presented in LRA Table 4.2.6.1 and found them accurate. These 52 EFPY mean RT_{NDT} values for Units 2 and 3 are less than the 64 EFPY mean RT_{NDT} value of 129.4 ºF used by the staff for determining the conditional failure probability of a circumferential weld. The 64 EFPY mean RT_{NDT} value from the staff SER dated July 28, 1998, is for a Babcock and Wilcox (B&W) weld, because B&W welded the circumferential welds in the vessels. Since the BFN 52 EFPY mean RT_{NDT} values are less than the 64 EFPY value from the staff SER dated July 28, 1998, the staff concluded that the BFN RV conditional failure probabilities are bounded by the staff analysis.

V. Proposed Alternative and Basis for Relief (Continued):

The applicant stated that the procedures and training used to limit cold over-pressure events will be the same as those approved by the staff when the applicant requested relief for the current license period, but it did not explicitly cite a document that supports this statement. The applicant stated that the procedure and training requirements identified in the applicant's request to use the BWRVIP-05 report are provided in the document, "Safety Evaluation by the Office of Nuclear Reactor Regulation Related to Alternative to Inspection of Reactor Pressure Vessel Circumferential Welds, BFN Power Station, Units 2 and 3," (attached to staff letter to TVA; 'Browns Ferry Nuclear Plant Unit 2, Relief Request 2-ISI-9, Alternatives for Examination of Reactor Pressure Vessel Shell Welds (TAC No. MA8424)," August 14, 2000; and staff letter to the applicant, "Browns Ferry Nuclear Plant Unit 3, Relief Request 3-ISI-1, Revision 1, Alternatives for Examination of Reactor Pressure Vessel Shell Welds (TAC No. MA5953)," November 18, 1999. The applicant further stated that LRA Section 4.2.6, and associated LRA Section A.3.1.6, reference the safety evaluation request letters identified above. The staff found the response acceptable because the applicant identified the requested references and commits to include them in LRA Sections 4.2.6 and A.3.1.6.

Subsequent to the NRC approval of the LRA and in accordance with License Commitment 39 (NUREG 1843), revised RCS P/T limit curves for BFN Unit 3 were submitted to the NRC for approval (Reference 3) and subsequently approved by the NRC in Amendment No. 278 (References 4 and 5). Table 2 provides a comparison of the BFN Unit 3 RV limiting circumferential weld parameters for the period of extended operation to those used in the NRC evaluation of BWRVIP-05.

Table 2 contains the values from Table 4.2.6.1 of the LRA and Table B-5 of Enclosure 3 from the application for the revised P/T limit curves (Reference 3). The values for the projected fluence for the limiting circumferential weld associated with the revised P/T limit curves reflects a reduced fluence for 54 EFPY compared to the projected fluence contained in the LRA for 52 EFPY.

B&W 64 EFPY data provided in Table 2 is taken from Table 2.6.5 of the Final Safety Evaluation of the BWRVIP-05 Report (Reference 6).

V. Proposed Alternative and Basis for Relief (Continued):

TABLE 2			
Group	B&W 64 EFPY	BFN Unit 3 52 EFPY (LRA Values) Shell 1 to Shell 2 Weld Heat No. D55733	BFN Unit 3 54 EFPY (Revised P/T Limit Values Shell 1 to Shell 2 Weld Heat No. D55733
Cu %	0.31	0.09	0.09
Ni %	0.59	0.66	0.66
CF	196.7	117	117
Fluence at Clad/Weld Interface 10^{19} n/cm^2	0.19	0.19	0.180
Delta RT_{NDT} Without Margin (ºF)	109.4	65	63.7
Initial RT_{NDT} (ºF)	20	-40	-40
Mean RT_{NDT} (ºF)	129.4	25	23.7
P (F/E) NRC	4.83×10^{-4}	_____	_____
P (F/E) BWRVIP	_____	_____	_____

The conditional failure probability, P (F/E), for BFN Unit 3 is bounded by the conditional failure probability calculated by the NRC for the limiting B&W vessel. In the NRC's evaluation of the BWRVIP-05 report, a fluence of 0.19×10^{19} n/cm^2 for B&W RVs was used for 64 EFPY and the corresponding delta RT_{NDT} value was 109.4 ºF. The delta RT_{NDT} value for the limiting beltline weld metal of BFN Unit 3 is less than the limiting delta RT_{NDT} value in the NRC's evaluation of BWRVIP-05 report. Therefore, the calculated mean RT_{NDT} value for the limiting beltline weld metal is acceptable and meets the requirements specified in the NRC SER for the BWRVIP-05 report.

VI. Duration of Proposed Alternative:

This relief is requested for examinations of the reactor vessel circumferential welds for the remaining term of the renewed license for BFN Unit 3 that expires July 2, 2036.

VII. Precedents:

This request for alternative is consistent with Request for Relief 3-ISI-1, approved for the duration of the original BFN Unit 3 Operating License (Reference 1).

Similar relief was approved for the periods of extended operation for BFN Unit 1 (Reference 7) and for the Peach Bottom Atomic Power Station, Units 2 and 3 (Reference 8).

VIII. References:

1. NRC letter to TVA, “Browns Ferry Nuclear Plant Unit 3, Relief Request 3-ISI-1, Revision 1, Alternatives for Examination of Reactor Pressure Vessel Shell Welds (TAC No. MA5953),” dated November 18, 1999 (ML993300264)

2. NUREG-1843, “Safety Evaluation Report Related to the License Renewal of the Browns Ferry Nuclear Plant, Units 1, 2, and 3”

3. TVA letter to NRC, CNL-14-144, “Browns Ferry Nuclear Plant, Unit 3 – Application to Modify Technical Specification 3.4.9, “RCS Pressure and Temperature (P/T) Limits” (BFN TS-494),” dated January 27, 2015 (ML15040A698)

4. NRC letter to TVA, “Browns Ferry Nuclear Plant, Unit 3 – Issuance of Amendment Regarding Modification of Technical Specification 3.4.9, “RCS Pressure and Temperature (P/T) Limits” (CAC No. MF5659),” dated January 7, 2016 (ML15344A321)

5. NRC letter to TVA, “Browns Ferry Nuclear Plant, Unit 3 - Correction to Amendment No. 278 Regarding Modification of Technical Specification 3.4.9, “RCS Pressure and Temperature (P/T) Limits” (CAC No. MF5659),” dated March 21, 2016 (ML16075A067)

6. NRC letter to BWRVIP Chairman, "Final Safety Evaluation of the BWRVIP Vessel and Internals Project BWRVIP-05 Report (TAC No. M93925),” July 28, 1998

7. NRC letter to TVA, “Browns Ferry Nuclear Plant, Unit 1 - Alternative Relief Request 1-ISI-27 for Relief from the Reactor Vessel Circumferential Weld Examination Requirements of the ASME Code (CAC No. MF6401), February 17, 2016 (ML16020A115)

8. NRC letter to Exelon Generation Company, LLC, “Peach Bottom Atomic Power Station, Units 2 and 3 - Requests for Relief I4R-51 and I4R-52 (TAC Nos. ME5392, ME5393, ME5394 and ME5395),” dated January 24, 2012 (ML112770217)

IX. Attachment:

Browns Ferry Unit 3 RPV shell weld location schematic drawing.

Attachment

Browns Ferry Unit 3 RPV Shell Weld Location Schematic Drawing