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SUBJECT: Forwards supplements info to support NRC review of proposed TS change TS-393,revising pressure-temp curves to extend validity of curves to 32 EFPY.

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December 15, 1998

TVA-BFN-TS-393, Supplement 1 10 CFR 50.90

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

Gentlemen:

In the Matter of) Docket Nos. 50-260
Tennessee Valley Authority) 50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - UNITS 2 AND 3 - TECHNICAL SPECIFICATION (TS) CHANGE NO. 393, SUPPLEMENT 1 - PRESSURE-TEMPERATURE (P-T) CURVE UPDATE

The enclosures provide supplemental information to support the NRC staff's review of proposed technical specification change TS-393. TVA submitted TS-393 to NRC by letter on March 3, 1998 to revise the BFN Units 2 and 3 P-T curves to extend the validity of the curves to 32 effective full power years (EFPY). The enclosed information addresses two issues raised by the staff: 1) The acceptability of the fluence used by TVA which was partially based upon flux wire data, and 2) the applicability of additional generic initial RT_{NDT} data reported by Framatome Technologies Inc. to the BFN Units 2 and 3 reactor pressure vessels.

To resolve these issues TVA has re-evaluated the proposed P-T curves utilizing a conservative analytical fluence and has incorporated the generic Framatome initial RT_{NDT} data. The re-evaluated Units 2 and 3 P-T curves are identical to the curves

submitted by the March 3, 1998, letter with the exception that the proposed P-T curves are valid to 16 EFPY and 20 EFPY respectively. TVA has adopted the Framatome data and methodology in order to facilitate NRC review, since the Framatome data and methodology have previously received NRC approval for Commonwealth Edison P-T curve updates. Use of the Framatome methodology for this licensing action does not preclude future re-assessments of the BFN initial RT_{NDT} data using other NRC-approved methodology. It is TVA's expectation that this supplemental information will enable the staff to complete its reviews. The Unit 2 curve is projected to expire on February 5, 1999, therefore, expedited NRC review is requested.

The information contained in the Enclosures reflects clarifications of the issues as discussed with the NRC staff during telephone calls on November 24, 1998 and December 8, 1998.

There are no new commitments contained in this letter. If you have any questions about this change, please telephone me at (256) 729-2636.

Sincerely,

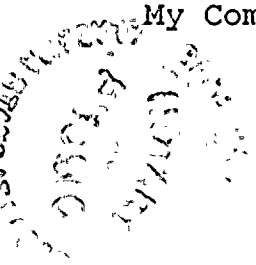
T. E. Abney
Manager of Licensing
and Industry Affairs

Enclosures
cc: See page 3

Subscribed and sworn to before me
on this 15th day of December 1998.

Barbara A. Blanton
Notary Public

My Commission Expires 9/22/2002



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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 2 AND 3

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS-393, SUPPLEMENT 1
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

NRC Request

In TVA's submittal of March 3, 1998, TVA indicated that the initial RT_{NDT} value for the Browns Ferry Units 2 and 3 electroslag welds is 10° F. By NRC Safety Evaluation dated February 5, 1997, the staff generically addressed the IRT_{NDT} value for the Dresden and Quad Cities electroslag welds (also addressed in BAW-2258 and 2259). COMED determined the mean value of the initial RT_{NDT} to be 23.1° F. with a standard deviation of 13° F. for the Dresden and Quad Cities electroslag welds. The staff found these values to be acceptable. In light of this review, explain why it is appropriate for TVA to use a value of 10° F. for the Browns Ferry Units 2 and 3 electroslag welds. This issue must be resolved in order to complete the review of the Browns Ferry P-T limits and the licensee's response to Generic Letter 92-01, Supplement 1. How would TVA propose to resolve this issue?

TVA Response

TVA has re-evaluated the proposed Unit 2 and 3 pressure-temperature (P-T) limits submitted by Reference 1 utilizing updated best-estimate chemistry, best-estimate initial RT_{NDT} values, and a conservative end-of-life reactor pressure vessel (RPV) peak surface fluence. The results of this re-evaluation are reflected on the revised ART tables contained in Enclosure 2 and revised TS P-T limits for Units 2 and 3 contained in Enclosure 4. Enclosure 3 contains marked pages describing the proposed changes in relation to the current Units 2 and 3 Improved Technical Specifications.

The best estimate initial RT_{NDT} value (23.1° F.) and associated standard deviation (13.0° F.) reported by Framatome Technologies, Inc. (FTI) in the Reference 2 and 3 reports were incorporated in the re-evaluation of the BFN Units 2 and 3 RPV longitudinal electroslag welds (ESW). The longitudinal ESWs are the limiting material for the Units 2 and 3 P-T curves. TVA has previously adopted the best-estimate chemistry documented in the Framatome reports by Reference 5. Accordingly the corresponding chemistry

factors presented on the revised ART tables in Enclosure 2 reflect the Framatome data. Previous NRC review and acceptance of the Framatome best-estimate chemistry and best-estimate initial RT_{NDT} values are documented in Reference 4.

In addition, the re-evaluation of Units 2 and 3 P-T limits utilized a conservative, calculated 32 EFPY RPV peak surface fluence of 1.07E18 n/cm^2 multiplied conservatively by 1.05 factor to account for the effects of a 5 percent power level uprate. This fluence value was previously submitted to NRC by Reference 6 for inclusion in the Reactor Vessel Integrity Database. Imposing an increase in fluence to the proposed P-T curves decreased the period to which the curves are valid. Fluence values (interpolated from the 32 EFPY peak RPV fluence) at various periods were used to recalculate the ART for the beltline plate and weld materials. The objective of the re-evaluation was to determine the EFPY in which the ART values were equal to or less than the ART values associated with the P-T curves originally submitted in Reference 1. As a result, new EFPY have been applied to the Reference 1 curves. This analysis supports a P-T curve validity of 16 EFPY for Unit 2 and 20 EFPY for Unit 3.

TVA has reviewed the Reference 1 submittal and has determined that the conclusions of the previously submitted safety analysis, proposed finding of no significant hazards considerations and environmental impact consideration remain valid.

ENCLOSURE 1

REFERENCES

1. Letter from TVA to NRC dated March 3, 1998, Units 2 and 3 - Technical Specification (TS) Change No. 393 - Pressure-Temperature Limits.

2. "Evaluation of RT_{NDT}, USE, and Chemical Composition of Core Region Electroslag Welds for Dresden Units 1 and 2," Framatome Technologies, BAW-2258, January 1996.

3. "Evaluation of RT_{NDT}, USE, and Chemical Composition of Core Region Electroslag Welds for Quad Cities Units 1 and 2," Framatome Technologies, BAW-2258, January 1996.

4. NRC letter to Commonwealth Edison dated February 28, 1998, Issuance of Amendments.

5. TVA letter to NRC dated September 8, 1998, Generic Letter 92-01, Supplement 1, Reactor Vessel Structural Integrity - Response to NRC Request for Additional Information.

6. TVA letter to NRC dated March 27, 1995, Units 1, 2, and 3 - Generic Letter 92-01, Reactor Vessel Structural Integrity - Update To The Initial Reference Nil-Ductility Temperature (RT_{NDT}), Chemical Composition and Fluence Values.

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 2 AND 3

PROPOSED TECHNICAL SPECIFICATION (TS) CHANGE TS-393, SUPPLEMENT 1
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

REVISED ART TABLES

See attached.

BELTLINE ART VALUES FOR BROWNS FERRY UNIT 2 AT 16 EFPY CONSIDERING POWER UPRATE

Low-Int Shell
Thickness = 6.13 inches

Low-Int Shell:
32 EFPY Peak I.D. fluence = 1.1E+18 n/cm^2
32 EFPY Peak 1/4 T fluence = 7.8E+17 n/cm^2

Lower Shell
Thickness = 6.13 inches

Lower Shell:
32 EFPY Peak I.D. fluence = 1.1E+18 n/cm^2
32 EFPY Peak 1/4 T fluence = 7.8E+17 n/cm^2

COMPONENT	I.D.	HEAT	%Cu	%Ni	CF	INITIAL RTndt	16 EFPY Delta RTndt[1]	SIGMA I	SIGMA Delta	MARGIN	16 EFPY SHIFT	16 EFPY ART
PLATES:												
Lower Shell	6-127-14	C2467-2	0.16	0.52	112	-20	28.5	0	14.3	28.5	57.1	37.1
Lower Shell	6-127-15	C2463-1	0.17	0.48	117	-20	29.8	0	14.9	29.8	59.6	39.6
Lower Shell	6-127-17	C2460-2	0.13	0.51	88	0	22.4	0	11.2	22.4	44.9	44.9
Low-Int Shell	6-127-6	A0981-1	0.14	0.55	98	-10	25.0	0	12.5	25.0	50.0	40.0
Low-Int Shell	6-127-16	C2467-1	0.16	0.52	112	-10	28.5	0	14.3	28.5	57.1	47.1
Low-Int Shell	6-127-20	C2849-1	0.11	0.50	73	-10	18.6	0	9.3	18.6	37.2	27.2
WELDS:												
Longitudinal	ESW*		0.24	0.37	141	23.1	35.8	13.0	17.9	44.3	80.1	103.2
Circumference	D55733		0.09	0.65	117	-40	29.8	0	14.9	29.8	59.6	19.6

* ESW chemistry based on BAW-2258/2259.

* Specific weld heat chemistries are not available.

[1] Based on fluence interpolations from 32 EFPY.

BELTLINE ART VALUES FOR BROWNS FERRY UNIT 3 AT 20 EFPY CONSIDERING POWER UPRATE

Low-Int Shell
Thickness = 6.13 inches

Low-Int Shell:
32 EFPY Peak I.D. fluence = 1.1E+18 n/cm^2
32 EFPY Peak 1/4 T fluence = 7.8E+17 n/cm^2

Lower Shell
Thickness = 6.13 inches

Lower Shell:
32 EFPY Peak I.D. fluence = 1.1E+18 n/cm^2
32 EFPY Peak 1/4 T fluence = 7.8E+17 n/cm^2

COMPONENT	I.D.	HEAT	%Cu	%Ni	CF	INITIAL RTndt	20 EFPY Del ta RTndt[1]	SIGMA I	SIGMA Delta	MARGIN	20 EFPY SHIFT	20 EFPY ART
PLATES:												
Lower Shell	6-145-4	C3222-2	0.15	0.52	106	10	30.6	0	15.3	30.6	61.1	71.1
Lower Shell	6-145-7	C3213-1	0.13	0.58	90	-20	25.9	0	13.0	25.9	51.9	31.9
Lower Shell	6-145-12	C3217-2	0.14	0.66	101.5	-4	29.3	0	14.6	29.3	58.5	54.5
Low-Int Shell	6-145-1	C3201-2	0.13	0.60	91	-20	26.2	0	13.1	26.2	52.5	32.5
Low-Int Shell	6-145-2	C3188-2	0.10	0.48	65	-20	18.7	0	9.4	18.7	37.5	17.5
Low-Int Shell	6-145-6	B7267-1	0.13	0.51	88	-20	25.4	0	12.7	25.4	50.7	30.7
WELDS:												
Longitudinal	ESW*		0.24	0.37	141	23.1	40.5	13	20.3	48.2	88.7	111.8
Circumference	D55733		0.09	0.66	117	-40	33.7	0	16.9	33.7	67.5	27.5

* ESW chemistry based on BAW-2258/2259.

* Specific weld heat chemistries are not available.

[1] Based on fluence interpolations from 32 EFPY.