

December 8, 2003

TVA-BFN-TS-441R1

10 CFR 50.90

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

Gentlemen:

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

**BROWNS FERRY NUCLEAR PLANT (BFN) - TVA RESPONSE TO NRC  
REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING UNITS 2  
AND 3 - TECHNICAL SPECIFICATIONS (TS) CHANGE NO. 441R1 -  
UPDATE OF PRESSURE - TEMPERATURE (P-T) CURVES**

By letter dated September 18, 2003, BFN submitted a license amendment request for NRC approval of updated P-T curves for BFN Units 2 and 3. On November 5, 2003, the NRC staff communicated to TVA a request for additional information. This letter provides TVA's response to this request.

The two NRC questions are repeated in the enclosure along with the TVA response. TVA has determined this additional information response does not change the determination in the September 18, 2003, TS-441R1 submittal that there are no significant hazards considerations associated with the proposed change and that the TS change qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and the Enclosure to the Alabama State Department of Public Health.

There are no regulatory commitments associated with this letter. If you have any questions about this letter or TS-441R1, please contact me at (256) 729-2636.

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I declare under penalty of perjury that the foregoing is true and correct. Executed on December 8, 2003.

Sincerely,

Original signed by:

T. E. Abney  
Manager of Licensing  
and Industry Affairs

Enclosure:  
Response to Request for Additional Information

Enclosure  
cc (Enclosure):  
State Health Officer  
Alabama State Department of Public Health  
RSA Tower - Administration  
Suite 1552  
P.O. Box 303017  
Montgomery, Alabama 36130-3017

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DTL:PSH:BAB

Enclosure

cc (Enclosure):

- A. S. Bhatnagar, PAB 1E-BFN
- M. J. Burzynski, BR 4X-C
- J. E. Maddox, LP 6A-C
- R. G. Jones, NAB 1A-BFN
- R. F. Marks, PAB 1A-BFN
- D. C. Olcsvary, LP 6A-C
- C. M. Root, PAB 1G-BFN
- J. R. Rupert, NAB 1A-BFN
- K. W. Singer, LP 6A-C
- M. D. Skaggs, POB 2C-BFN
- E. J. Vigluicci, ET 11A-K
- NSRB Support, LP 5M-C
- EDMS-K

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ENCLOSURE  
BFN TS-441R1 NRC STAFF RAI QUESTIONS/TVA RESPONSES

<p style="text-align: center;">NRC Question #1</p>	<p><i>Please provide thermal stress intensity factors (<math>K_t</math>) at 1/4T locations for cooldown rates of 100°F/hr.</i></p>
<p style="text-align: center;">TVA Response</p>	<p>The thermal stress intensity factor, <math>K_t</math>, at 1/4T for cool-down rates of 100°F/hr, as described in Section 4.3.2.2.4 of GE Report GE-NE-0000-0013-03193-01, is determined as follows: Using Equation 4-15 from the previous section of the report:</p> $T = Gx^2/2\beta - GCx/\beta + T_0 \quad (4-15)$ <p>Equation 4-15 can be solved for the through-wall temperature (<math>x = C</math>), resulting in the absolute value of <math>\Delta T</math> for heat-up or cool-down of :</p> $\begin{aligned} \Delta T &= GC^2/2\beta \\ &= 100 * (0.526)^2/(2*0.354) = 39^\circ\text{F} \end{aligned} \quad (4-16)$ <p>where:</p> <p style="margin-left: 40px;"><math>G = 100^\circ\text{F}</math>, the cool-down rate stated in the RAI  <math>C = \text{minimum vessel thickness, including clad thickness, } 6.125" + 0.188" = 6.313"/12" = 0.526 \text{ ft}</math>  <math>\beta = \text{thermal diffusivity at } 550^\circ\text{F (conservative)} = 0.354 \text{ ft}^2/\text{hr}</math></p> <p>The analyzed case for thermal stress is a 1/4T flaw depth with a wall thickness of <math>C = 0.526 \text{ ft}</math>. The corresponding value of <math>M_t</math> can be interpolated from ASME Appendix G, Figure G-2214-2; <math>M_t = 0.2914</math>.</p> <p>Therefore <math>K_{It}</math> is calculated as:</p> $\begin{aligned} K_{It} &= M_t * \Delta T \\ &= 0.2914 * 39^\circ\text{F} \\ &= 11.39 \text{ ksi in}^{1/2} \end{aligned}$ <p style="margin-left: 40px;">This value of <math>K_{It}</math> was used in the calculation of the P-T limit for all pressures.</p>

ENCLOSURE  
BFN TS-441R1 NRC STAFF RAI QUESTIONS/TVA RESPONSES

<p style="text-align: center;">NRC Question #2</p>	<p><i>For the heat-up and cool-down calculation shown on page 39 of GE report # GE-NE-0000-0013-3193-01 for Feedwater nozzle upper vessel region, the value of <math>M_m</math> was based on 4a. The definition of "a" is shown on page 32 of the report. Please discuss the basis for using this value.</i></p>
<p style="text-align: center;">TVA Response</p>	<p>The value of "a" represents the flaw depth at 1/4T; therefore, the thickness for the blend radius at the intersection of the nozzle at the vessel wall is 4a; the evaluation is performed for this blend radius location.</p> $  \begin{aligned}  a &= (t_v^2 + t_n^2)^{1/2}/4 \\  &= [(6.1875)^2 + (7.125)^2]^{1/2}/4 \\  &= 2.36 \text{ inches}  \end{aligned}  $ <p>where: <math>t_v</math> = vessel thickness = 6.1875 inches  <math>t_n</math> = nozzle thickness = 7.125 inches</p> <p>The value of <math>4a = [(6.1875)^2 + (7.125)^2]^{1/2} = 9.4367</math> inches, the thickness of the blend radius.</p>