

Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609

May 1, 1998

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

Gentlemen:

In the Matter of ) Docket Nos. 50-259 Tennessee Valley Authority ) 50-260 50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - SUPPLEMENTAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING UNITS 2 and 3 TECHNICAL SPECIFICATION (TS) CHANGE TS - 384, - REQUEST FOR LICENSE AMENDMENT FOR POWER UPRATE OPERATION, (TAC NOS. M99711, M99712) AND RESOLUTION OF CONTROL ROOM EMERGENCY VENTILATION SYSTEM (CREVS) ISSUES (TAC NOS. M83348, M83349, M83350)

This letter supplements the April 1, 1998, letter (Reference 1), in which TVA provided additional information requested by NRC in support of TS-384 and the resolution of CREV system issues. On October 1, 1997, TVA provided TS-384, an amendment to Operating Licenses DPR-52 and DPR-68 that will allow Units 2 and 3 to operate at an uprated power level of 3458 MWt. Also, on July 31, 1992, TVA provided a letter describing corrective actions resolving previous deficiencies identified with the CREVS.

This supplemental response completes the TVA reply to NRC Request B.2 in the February 18, 1998, letter (Reference 2). This request questioned the methodology used to determine the control room atmospheric dispersion (X/Q) values described in the August 10, 1994, letter (Reference 3). In Reference 1, TVA committed to recalculate the atmospheric dispersion (X/Q) values for the non-fumigation top of stack releases at both control room ventilation intake points and revise the control room dose calculation if necessary. The results of this

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recalculation are included in Enclosure 1. The latest control room operator dose calculation is included in Enclosure 2 for your information.

In Reference 3, TVA voluntarily included the dose contribution from the main steam isolation valve (MSIV) leakage in the assessment of control room operator doses in an effort to resolve the control room ventilation system issues. TVA notes that the current BFN design and licensing basis considers MSIV leakage as a component of the total containment leakage, all of which is assumed to leak into the secondary containment enclosure. MSIV leakage is not considered as a bypass path from secondary containment directly into the turbine building.

There no commitments made in this letter. If you have any questions, please telephone me at (256) 729-2636.

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Manager of Licensing and Industry Affairs

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### REFERENCES

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- 1. TVA letter to NRC, dated Wril 1, 1998, Browns Ferry Nuclear Plant (BFN) - Response to Request for Additional Information (RAI) Regarding Units 2 and 3 Technical Specification (TS) Change TS - 384, - Request for License Amendment for Power Uprate Operation (TAC Nos. M99711, M99712), and Resolution of Control Room Emergency Ventilation System (CREVS) Issues (TAC Nos. M83348, M83349, M83350)
- 2. NKC letter to TVA, dated February 18, 1998, Browns Ferry Plant Units 2 and 3 - Request for Additional Information Regarding Technical Specification Change TS-384 Request for License Amendment for Power Uprate Operation (TAC Nos. M99711 and M99712) and Resolution of Control Room Emergency Ventilation System Issues (TAC Nos. 83348, M83349, and M83350)
- 3. TVA letter to NRC dated August 10, 1994, Browns Ferry Nuclear Plant (BFN) - Response to Request for Additional Information Regarding the Control Room Emergency Ventilation System (CREVS) [TAC Nos. M83348, M83349, and M83350]

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### ENCLOSURE 1

### TENNESSEE VALLEY AUTHORITY BROWNS FERRY NUCLEAR PLANT (BFN) UNITS 1, 2, AND 3

# SUPPLEMENTAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING UNITS 2 and 3 TECHNICAL SPECIFICATION (TS) CHANGE TS -384, - REQUEST FOR LICENSE AMENDMENT FOR POWER UPRATE OPERATION, (TAC NOS. M99711, M99712) AND RESOLUTION OF CONTROL ROOM EMERGENCY VENTILATION SYSTEM (CREVS) ISSUES (TAC NOS. M83348, M83349, M83350)

This enclosure completes TVA's response to NRC request B.2 in the February 18, 1998, RAI (Reference 1).

## B. CONTROL ROOM EMERGENCY VENTILATION SYSTEM CORRECTIVE ACTIONS

#### NRC Request B.2.

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TVA's letter dated August 10, 1994, explained the methodology used to determine the control room atmospheric dispersion (X/Q) values used in the dose analysis. The staff has a concern with the extremely low values of X'Q postulated for an elevated release. Our confirmatory analyses indicate that the postulated values may be low by as much as six orders of magnitude. In the analysis, the distance to the closest Control Room Ventilation System (CREV) system intake (Unit 1) was used. The Unit 3 intake, although farther away, would appear to yield the most restrictive, X/Q value. For an elevated release, the ground level concentrations increase rapidly with the increasing distance until the lower surface of the plume reaches ground level due to vertical diffusion. From this point, the concentrations decrease with increasing distance. Both CREV intakes are within this cavity where the concentrations are increasing. The concentrations due to fumigation may increase similarly. Please justify the values or re-assess the X/Q values used and update the dose analysis accordingly.

## TVA Reply

As indicated in TVA's April 1, 1998 letter (Reference 2), the selection of the nearest (Unit 1) CREV system intake from the plant stack could yield non-conservative X/Q values for the non-fumigation top of stack release, as compared to the most distant (Unit 3) CREV system intake. The response also points out that the X/Q values for the other stack release scenarios

are larger at the Unit 1 control room ventilation intake. TVA concluded that the above identified non-conservatism would not raise control room doses beyond General Design Criteria (GDC) 19 limits and has recalculated X/Q values at the Unit 1 and Unit 3 CREV system intakes. Accordingly, the control room dose calculation has been revised to include both intakes. The results of the reevaluation are presented below.

The Unit 1 and Unit 3 CREV system intake X/Q values were derived according to the techniques identified in Section III, "Derivation of Dispersion Coefficients (X/Qs)," in the August 10, 1994, letter (Reference 3) with the following minor exceptions:

- The effective stack height for the top of stack fumigation case was conservatively reduced from 165 to 163 meters to be consistent with the non-fumigation case (see pages E-8 and E-10 of Reference 3);
- Eleven years of BFN meteorological data, including the most recent year (1987-1997) was used in the logarithmic interpolation with the short-term X/Q values to generate the intermediate period X/Q values (see pages E-11, E-15 and E-16 of Reference 3);
- The receptor sectors of influence for the Unit 1 CREV system intake are from upwind directions 229° - 297°, accounting for source-receptor geometry. The Unit 3 receptor sectors of influence are from upwind directions 246° - 314° (see pages E-12, E-16 and E-40 of Reference 3);
- The effective stack height for the base of stack releases is 0 meters (ground level release) since the CREV system intakes are above the base of the stack (see page E-17 of Reference 3);
- The distance from the stack to the Unit 1 CREV system intake is approximately 166 meters. The distance from the stack to the Unit 3 CREV system intake is approximately 283 meters (see page E-40 of Reference 3).

The following table presents the X/Q values for the Unit 1 and Unit 3 CREV system intakes for a 30 day period.

Normalized Concentrations (X/Q) for the Unit 1 and Unit 3 CREV System Intakes for Various Time Periods For Each Release Scenario

Time after release point	0-0.5 hr	0.5-2 hr	2-8 hr	8-24 hr	1-4 days	4-30 days	Ann Avg.
Top of Stack	3.40E-5	5.90E-15	4.29E-15	3.65E-15	2.58E-15	1.57E-15	8.55E-16
Bottom Of Stack	3.70E-3	3.70E-3	2.38E-3	1.91E-3	1.19E-3	5.97E-4	2.58E-4

UNIT 1 CREV INTAKE NORMALIZED CONCENTRATION (X/Q) (sec/m<sup>3</sup>)

UNIT 3 CREV INTAKE NORMALIZED CONCENTRATION (X/Q) (sec/m<sup>3</sup>)

Time after release point	0-0.5 h	.5-2 hr	2-8 hr	8-24 hr	1-4 days	4-30 days	Ann Avg.
Top of Stack	3.02E-5	9.64E-7	1.89E-7	8.37E-8	1.43E d	1.13E-9	5.06E-11
Bottom Of Stack	1.20E-3	1.20E-3	7.91E-4	6.42E-4	4.09E-4	2.14E-4	9.65E-5

Note: For the Top of Stack release point, the 0-0.5 hr X/Q is represented by the fumigation condition.

The new X/Q values were then used to recalculate the control room dose contribution for the limiting loss of coolant accident (LOCA) event. The thyroid dose (most limiting) was calculated assuming 100% of the makeup flow into the control bay habitability zone was coming from the Unit 1 (closest to the stack) intake. The same was done for the Unit 3 (farthest from the stack) intake. The control room dose resulting from these calculations is shown below:

### CONTROL ROOM DOSE (rem)

	Unit 1 Intake	Unit 3 Intake
Bottom of Stack Release Point	12.62	4.45
Top of Stack Release Point	1.71	3.43
Total	14.33	7.88

Since only 50% of the control room makeup flow is from each intake, these doses were averaged to give a total control room thyroid dose of 11.11 rem. This is an extremely conservative approach since it assumes the centerline of the plume occurs at both intakes simultaneously, when realistically it can occur at only one intake structure at a time.

Therefore, the contribution to control room thyroid dose due to consideration of stack releases (11.11 rem) is within GDC 19 limits (30 rem) for the Unit 1 and Unit 3 control room intakes. It should be noted that the current BFN design and licensing basis considers main steam line isolation valve (MSIV) leakage as a component of the total containment leakage, all of which is assumed to leak into the secondary containment enclosure. MSIV leakage is not considered as a bypass path from secondary containment directly into the turbine building. A copy of the latest revision of the control room dose calculation is enclosed for your information.

### REFERENCES

- NRC letter to TVA, dated February 18, 1998, Browns Ferry Plant Units 2 and 3 - Request for Additional Information Regarding Technical Specification Change TS-384 Request for License Amendment for Power Uprate Operation (TAC Nos. M99711 and M99712) and Resolution of Control Room Emergency Ventilation System Issues (TAC Nos. 83348, M83349, and M83350)
- 2. TVA letter to NRC, dated April 1, 1998, Browns Ferry Nuclear Plant (BFN) - Response to Request for Additional Information (RAI) Regarding Units 2 and 3 Technical Specification (TS) Change TS - 384, - Request for License Amendment for Power Uprate Operation (TAC Nos. M99711, M99712), and Resolution of Control Room Emergency Ventilation System (CREVS) Issues (TAC Nos. M83348, M°3349, M83350)
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#### ENCLOSURE 2

# TENNESSEE VALLEY AUTHORITY BROWNS FERRY NUCLEAR PLANT (BFN) UNITS 1, 2, AND 3

SUPPLEN\_NTAL RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING UNITS 2 and 3 TECHNICAL SPECIFICATION (TS) CHANGE TS -384, - REQUEST FOR LICENSE AMENDMENT FOR POWER UPRATE OPERATION, (TAC NOS. M99711, M99712) AND RESOLUTION OF CONTROL ROOM EMERGENCY VENTILATION SYSTEM (CREVS) ISSUES (TAC NOS. M83348, M83349, M83350)

This enclosure provides the latest control room operator dose calculation.

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