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

May 5, 1992

O. J. "Ike" Zeringue
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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) - CONTROL ROOM EMERGENCY VENTILATION SYSTEM (CREVS)

This letter provides a list of corrective actions and an action plan for defining the remaining corrective actions required to resolve previous deficiencies identified with the CREVS. Upon implementation of the corrective actions, BFN will be in full compliance with General Design Criterion (GDC) 19 - Control Room.

In References 1 and 2, TVA requested approval to allow operation of Browns Ferry Unit 2 during Cycle 6 with the CREVS inoperable because it did not meet its design basis for essentially zero unfiltered inleakage. Compensatory actions were taken to ensure that GDC limits were not exceeded. This request was approved by Reference 3. The schedule for providing the long term corrective action plan was modified in Reference 4.

Enclosure 1 to this letter summarizes the background of this issue, describes the alternatives investigated, provides a list of corrective actions and an action plan for defining the remaining corrective actions, discusses the operator dose calculation methodology and its conformance to current regulatory guidance. A description of the results of the control bay habitability zone analysis and/or testing, a complete description of the corrective actions, and the results of the control room operator dose calculations will be submitted to NRC by the end of July, 1992.

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A summary list of commitments contained in this letter is provided as Enclosure 2. If you have any questions, please contact R. R. Baron, Manager of Site Licensing, at (205) 729-3570.

Sincerely,

O. J. Zeringue

Enclosure
cc (Enclosure):
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REFERENCES

1) TVA letter, dated February 14, 1989, Unit 1, 2, and 3 Technical Specification No. 265T

2) TVA letter, dated July 14, 1989, Technical Specification (TS) No. 265T Control Room Habitability

3) NRC letter, dated September 18, 1989, Technical Specification Revisions Concerning Operability of the Control Room Emergency Ventilation System (TAC 72198, 72199, 72200) (TS 265T) Browns Ferry Nuclear Plants, Units 1, 2, and 3

4) TVA letter, dated November 21, 1991, Control Room Emergency Ventilation System (CREVS) Corrective Action Plan

ENCLOSURE 1
BROWNS FERRY NUCLEAR PLANT (BFN)
CONTROL ROOM EMERGENCY VENTILATION SYSTEM

BACKGROUND:

The Control Room Emergency Ventilation System (CREVS) is designed to protect the control room operators by automatically starting on receipt of a control room isolation signal and pressurizing the main control bay habitability zone with filtered outdoor air during accident conditions that could result in radioactive releases. This filtered air maintains the control room at a positive pressure so that all leakage should be outleakage. The CREVS uses charcoal adsorbers to assure the removal of radioactive iodine from the air and high efficiency particulate absolute (HEPA) filters for removing radioactive particulate matter.

The Control Bay ventilation towers, located on the north wall of the reactor building, provide the outside air for the Control Building supply ductwork. Ventilation fans, which are located in the ventilation towers, pressurize the supply ductwork that traverses the main control bay habitability zone. These fans operate during the accident recovery period (30 days) to supply necessary cooling for essential equipment. The existing CREVS units take suction from these positively pressurized ducts.

During the Unit 2 Cycle 5 outage, an employee concern identified a specific condition that could impact the ability of the CREVS to provide an environment suitable for personnel occupancy. The Control Building air supply ducts are not designed or fabricated to be leak tight. Unfiltered outside air could leak from the seams/joints of the supply air ducts that traverse the control bay habitability zone. This duct leakage could result in make-up air bypassing the CREVS and introducing potentially contaminated and unfiltered outside air into the control bay habitability zone.

Duct leakage was not accounted for in the previous control room dose calculations. A condition adverse to quality report was initiated and this was determined to be an unanalyzed condition. A survey of the ducts that pass through the habitability zone was completed and the ducts that contributed to the unfiltered inleakage were identified. A representative section of duct was leak tested and the results were used to estimate the total leakage of the supply duct work. Duct leakage was estimated to be 2750 CFM.

Following a postulated loss of coolant accident (LOCA), winds from the SSE, S or SSW sectors at speeds greater than thirty six miles per hour could offset the negative pressure maintained in the secondary containment by the standby gas treatment system (SGTS) and produce ex-filtration from the reactor building. TVA evaluated the applicable design basis events and determined that a postulated LOCA is the controlling event in terms of radioactivity release and dose consequences to the control room operators.

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General Design Criterion (GDC) 19 - Control Room, limits control room operator doses to 5 rem whole body, or its equivalent to any part of the body (30 rem thyroid). When TVA postulated a LOCA, coupled with the unfiltered inleakage and the high winds, the resulting thyroid doses would be in excess of the GDC 19 limits unless compensatory actions were taken.

During the current Unit 2 operating cycle (Cycle 6), TVA temporarily modified the operability requirements for the Control Room Emergency Ventilation System (CREVS) in the Units 1, 2, and 3 Technical Specifications. This change involved annotating the limiting conditions for operation (LCOs) 3.7.E.1, 3.7.E.3, and 3.7.E.4 by an asterisk and defining the CREVS as being inoperable because it did not meet its design basis for essentially zero unfiltered inleakage. The Technical Specification Bases 3.7.E/4.7.E were also revised to reflect this change. Power operations and fuel movement are acceptable until just prior to startup for Unit 2 Cycle 7. During Cycle 6, CREVS is being maintained functional by performing all applicable surveillances. In the event that the applicable surveillances are not successfully performed, the actions required by the LCOs must be complied with.

Operation of Unit 2 during Cycle 6 was approved based upon the low probability of a postulated LOCA coupled with the high wind condition and the compensatory actions instituted by BFN. The compensatory actions included:

1) The operation of all three trains of the Standby Gas Treatment System following an accident to maximize the negative pressure inside secondary containment, and

2) The monitoring of plant radiological conditions to provide an early indication that the control room habitability zone may become degraded. Upon determination that there was a possibility that the iodine uptake dose to the thyroid could exceed 10 rem, potassium iodide tablets would be distributed to control room and Technical Support Center personnel.

DESCRIPTION OF ALTERNATIVES INVESTIGATED

Studies have been performed to identify and evaluate potential alternatives. The alternatives considered were:

- Replacing the existing duct with leak tight duct.

- Providing filtration of the supply air being introduced into the Control Building.

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CONTROL ROOM EMERGENCY VENTILATION SYSTEM
(CONTINUED)

- Seal and/or repair the existing ductwork.

- Re-route the existing ductwork outside the control bay habitability zone.

- Install a kidney type filtration system.

- Modify the Control Bay ventilation tower intakes to offset the affects of a meteorological inversion by reducing the concentration of effluents being introduced into the control bay habitability zone.

- Modify the Turbine Building and plant stack to reduce the concentration of effluents being introduced into the control room.

- Supplement the existing CREVS capacity.

The following physical constraints will significantly influence the selection of the final corrective action plan:

- Replacing or performing external modification to the ducts, which traverses the control bay habitability zone, would involve extensive work over the control room panels and operators. Construction noise and the potential for falling objects could challenge operations in the control room.

- Some of the ductwork that traverses the control bay habitability zone is insulated with asbestos. Improper removal of the asbestos could pose a risk to the health of the workers and the control room operators.

- The current inleakage, from the Control Building supply ductwork, assists in pressurizing the control room habitability zone. Reducing this pressurized inleakage decreases the ability to obtain a positive pressure in the control room under isolation conditions.

- Any modifications/actions that would require additional diesel generator capacity. The available margin on the diesel generators during certain accident scenarios is limited.

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BROWNS FERRY NUCLEAR PLANT
CONTROL ROOM EMERGENCY VENTILATION SYSTEM
(CONTINUED)

DESCRIPTION OF CORRECTIVE ACTIONS AND CORRECTIVE ACTIONS PLANNED

A list of corrective actions and an action plan for defining the remaining corrective actions, can be summarized as follows:

- Modify the control bay ventilation towers to reduce the concentration of effluents being introduced into the control bay habitability zone. This modification will involve extending the intakes and routing them to either side of the Turbine Building.

- Increase the leak tightness of the control bay habitability zone. This involves sealing penetrations, building expansion joints, installation of redundant bubble tight isolation dampers, and sealing other sources of outleakage.

- Establish procedures and perform testing to periodically ensure the ability to maintain a positive pressure in the control bay habitability zone.

- Remove the changes implemented under temporary Technical Specification Amendment 265T. Temporary Technical Specification Amendment 265 expires just prior to startup for Unit 2 Cycle 7. Therefore, its removal is an administrative change.

- Revise the applicable Technical Specification Bases section. The current section states: "The control room emergency ventilation system is designed to ... maintain the control room pressure to the design positive pressure so that all leakage should be out leakage." The revised section will the control bay habitability zone be maintained at a positive pressure.

- Submit a Technical Specification amendment request to address the new isolation dampers referenced from Surveillance Requirement 4.7.E.4. The appropriate bases section will also be revised. This amendment request will require approval prior to Unit 2 restart from the Cycle 6 outage.

- Perform analysis and/or testing of the control bay habitability zone to determine if modifications to the existing CREVS units or if additional CREVS capacity will be required. CREVS modifications or additional capacity will be installed, as required.

ENCLOSURE 1
BROWNS FERRY NUCLEAR PLANT
CONTROL ROOM EMERGENCY VENTILATION SYSTEM
(CONTINUED)

- Finalize calculations that document the control room operator thirty day integrated doses from a postulated LOCA are below the GDC 19 limit.

- Submit a description of the results of the control bay habitability zone analysis/testing, a description of the corrective actions, and the results of the dose calculations by the end of July 1992.

- Update the Browns Ferry Updated Final Safety Analysis Report.

RESULTS OF PRELIMINARY CONTROL ROOM OPERATOR DOSE CALCULATIONS

After the CREVS corrective actions are implemented, the resultant control room operator thirty day integrated doses from a postulated LOCA will be below the GDC 19 limit. TVA has performed preliminary calculations that assume an unfiltered inleakage of 2750 cfm, completion of the modifications to the control bay ventilation towers, and an additional 2500 cfm of CREVS capacity for each redundant train. The resultant operator dose is 1.6 rem whole body gamma, 0.65 rem beta, and 18 rem thyroid. The finalized calculation will determine the required CREVS capacity.

SUMMARY OF DOSE CALCULATION METHODOLOGY

The major attributes used in the preliminary dose calculations were:

1) The extreme wind conditions, which were originally assumed to produce ex-filtration from the Reactor Building, need not be postulated. A probabilistic risk assessment was performed to determine the likelihood of the exfiltration event occurring during the 30 day accident recovery. This probability of occurrence is below 10^{-7} and is no longer considered a credible event.

2) The primary containment leaks to the secondary containment (Reactor Building) at a rate of two percent per day. This is the maximum allowable leakage rate specified by Technical Specification 3.7.A.2.b.

ENCLOSURE 1
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3) In addition to the leakage from the primary containment to the secondary containment, the main steam isolation valves (MSIVs) were assumed to leak at a rate of 11.5 scfh. This is the maximum leakage rate allowed by Technical Specification 4.7.A.2.i. The leakage was assumed through the MSIVs, to the low pressure turbines and condensers, out the low pressure turbine seals, and through the Turbine Building roof vents.

4) The iodine removal efficiency of the Standby Gas Treatment System is 90/70 percent and the iodine removal efficiency of the CREVS is 90/90 percent for inorganic and organic respectively.

COMPARISON OF CALCULATION METHODOLOGY WITH REGULATORY GUIDANCE

While BFN was licensed prior to the issuance of the SRPs and the majority of the current Regulatory Guides, a comparison of the preliminary BFN dose calculation to selected regulatory guidance was performed to validate the major assumptions.

In general, BFN calculated the doses to the control room operators in accordance with the guidelines provided by Regulatory Guide 1.3, Assumptions used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactor, Rev. 2. The recommended core inventory, effects of radiological decay during holdup, reductions in radioactive material due to engineered safety features, Technical Specification cited containment leakage rate, no suppression pool iodine retention, fumigation conditions for ½ hour, no ground effects plume depletion, breathing rates, elevated and ground level releases, semi-infinite cloud model for beta doses, and site specific χ/Q values were used. BFN deviates from the Regulatory Guide 1.3 recommendations by taking credit for half of the reactor zone volume for mixing, iodine dose conversion factors from the ICRP Publication 30, 1979 instead of Publication 2, 1959, whole body gamma dose from a point kernel model instead of a semi-infinite cloud, and beta and gamma energies from TVA's Isotope Library Data File instead of the Table of Isotopes, 6th Edition.

Although Regulatory Guide 1.3 does not allow credit for iodine retention in the suppression pool, Standard Review Plan Section 6.5.5 subsequently allowed licensees to consider the pressure suppression pool as a fission product cleanup system. No credit was conservatively assumed for suppression pool cleanup.

ENCLOSURE 1
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CONTROL ROOM EMERGENCY VENTILATION SYSTEM
(CONTINUED)

CONCLUSION

The corrective actions taken to resolve previously identified CREVS concerns will ensure that post-accident radiation doses to the control room operators are maintained below regulatory limits.

ENCLOSURE 2
BROWNS FERRY NUCLEAR PLANT (BFN)
SUMMARY OF COMMITMENTS

The corrective actions, which will be implemented to resolve the deficiencies identified with the current CREVS configuration, can be summarized as follows:

- Modify the control bay ventilation towers to reduce the concentration of effluents being introduced into the control bay habitability zone.

- Increase the leak tightness of the control bay habitability zone.

- Establish procedures and perform testing to periodically ensure the ability to maintain a positive pressure in the control bay habitability zone.

- TVA will request the removal of the changes implemented under temporary Technical Specification Amendment 265T and TVA will revise the applicable Technical Specification Bases section. The revised section will the control bay habitability zone be maintained at a positive pressure.

- Submit a Technical Specification amendment request to address the new isolation dampers referenced from Surveillance Requirement 4.7.E.4. The appropriate bases section will also be revised.

- Perform analysis and/or testing of the control bay habitability zone to determine if modifications to the existing CREVS units or if additional CREVS capacity will be required. CREVS modifications or additional capacity will be installed, as required.

- Finalize calculations that document the control room operator thirty day integrated doses from a postulated LOCA are below the GDC 19 limit.

- Submit a description of the results of the control bay habitability zone analysis/testing, a description of the corrective actions, and the results of the dose calculations by the end of July 1992.

- Update the Browns Ferry Updated Final Safety Analysis Report.