

TENNESSEE VALLEY AUTHORITY

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FEB 16 1988

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) UNITS 1, 2, AND 3 - NRC INSPECTION REPORT NOS. 50-259/87-43, 50-260/87-43, AND 50-296/87-43, - RESPONSE TO NRC CONCERNS ON UNIT 2 DRYWELL FIRE

This letter is to provide TVA's response to NRC's concerns regarding the unit 2 drywell fire of November 2, 1987. These concerns were expressed to TVA in a letter from S. D. Richardson to S. A. White dated December 30, 1987, which transmitted the subject report. This report requested that TVA provide a written response stating the action taken or planned to resolve the identified concerns. Enclosure 1 provides background information and TVA's response.

We wish to emphasize that TVA considers this fire to be a very serious occurrence, not only from its safety significance but also financially and because of the possible adverse affects to the unit 2 restart schedule. TVA site personnel and management have placed a high priority on keeping your investigation team apprised of all developments and results of the TVA investigations.

Presently, four potential causes of the fire continue to be reviewed: vandalism, aged insulation, electrical thermal overload, and improper circuit protection. The investigation has focused on vandalism over the past several months.

The majority of the NRC concerns were also addressed as observations by the TVA Serious Accident Investigation Team (SAIT). The TVA Fire Recovery Program is addressing SAIT and NRC observations and concerns. Other activities of the Fire Recovery Program have included:

- a. Supporting Alcohol Tobacco and Firearms and the Federal Bureau of Investigation in their continuing investigation of the fire from the aspect that its cause is of suspicious origin.
- b. Division of Nuclear Engineering's (DNE) review of electrical breaker tests that have been performed on circuits affected by the fire.
- c. "Hand-over-hand" walkdown of the electrical cables in the fire area to verify all affected cables and anomalies that might help indicate root cause.

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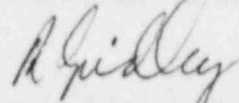
- d. Testing of cable samples to develop reliable temperature profiles and an evaluation using the profiles of the equipment near the fire area for possible degraded life or performance.
- e. Evaluations by our DNE personnel allowed removal of damaged material from the drywell.
- f. Damaged material was removed from the drywell and final cleanup of the fire area has been completed.
- g. Design of cable tray, conduit, and supports that are to be replaced is in process.

In summary, the scope of our Fire Recovery Program is to address any required corrective action or identified program enhancements, in addition to evaluating the physical effects of the fire and correcting damaged material.

If you have any questions, please telephone Clark Madden at (205) 729-2049.

Very truly yours,

TENNESSEE VALLEY AUTHORITY



R. Gridley, Director  
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Enclosure

cc: See page 3

U.S. Nuclear Regula' ry Commission

FEB 16 1988

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ENCLOSURE 1

RESPONSE

NRC INSPECTION REPORT NOS.

50-259/87-43, 50-260/87-43, 50-296/87-43

LETTER FROM S. D. RICHARDSON TO S. A. WHITE

DATED DECEMBER 30, 1987

1. NRC concern - Prefire plans are not provided for primary containment areas of the reactor building.

TVA action or plan - TVA agrees with this concern which had also been raised by TVA Fire Protection management before the fire. A prefire plan for BFN primary containments will be developed.

2. NRC concern - Trained personnel are not always available to aid the fire brigade team leader in determining the appropriate personnel protective equipment needed in plant areas containing toxic hazards. Toxic gas sampling of the air following the fire was not well controlled. No method was available at the time of the fire for detection of phosgene gas which would be expected as a result of burning polyvinyl chloride (PVC). The majority of the sampling effort was directed toward carbon monoxide although no contemporaneous logs were kept on the test results.

TVA action or plan - TVA's position is that this concern is addressed adequately with present procedures and personnel. Self-contained breathing apparatus (SCBA) are initially worn during emergencies, as was the case with this fire. Trained personnel are available to aid the Fire Brigade Team Leader during the day and evening shifts in determining appropriate protective equipment required for an emergency and are available for call-in response on the night shift. The SCBA is worn until such time as trained personnel have taken adequate measures to ensure the safety of the fire response team when removed.

Measurements for the presence of phosgene gas were taken during the drywell fire. Levels of the gas were quickly determined to be negligible. Levels of carbon monoxide (CO), however, were shown to be at levels hazardous to personnel without SCBA. Hence, most sampling efforts were directed towards the quantification of CO levels. Personnel logs and notations were kept of the sampling results. Samples were taken until it was conservatively safe to breathe without SCBA.

3. NRC concern - A fire watch left the 580 drywell area immediately after welding ceased. He should have maintained his watch for an additional 30 minutes after welding ceased as required by plant procedures.

TVA action or plan - TVA does not agree that this is an item of concern. The Fire Protection Program Plan allows a fire watch employee to be responsible for several activities as long as they are within the area of visibility. The firewatch employee in question proceeded with the welders to an adjacent area to start another job. The firewatch employee was able to visually observe both areas for the required 30 minutes after welding ceased; therefore, TVA feels no additional action is required and this concern should be resolved.

4. NRC concern - No post-maintenance testing was performed following the termination of temporary electrical connections through penetration EE.

TVA action or plan - TVA agrees that post-maintenance testing should have been performed on the temporary terminations through penetration EE. To prevent a recurrence of this concern, a revision to Modifications and Additions Instructions has been made to address how and when temporary connections should be tested.

5. NRC concern - The temporary electrical connections through penetration EE were not controlled as a temporary alteration and control room drawings were not updated.

TVA action or plan - TVA agrees with the basis of this concern. The Plant Operations Review Committee (PORC) did deliberate the adequacy of procedural controls offered by the maintenance request (MR). Use of a Temporary Alterations Control Form (TACF) was considered. However, PORC judged that the MR did constitute an adequate procedure, with appropriate controls, for the temporary installation and removal of the electrical connections through penetration EE. The MR did give adequate detailed instructions to personnel performing the work. However, the MR did not have all of the administrative controls offered by the procedure governing temporary alterations. It should be noted that no control room drawings required updating because all connections were made according to the issued drawings.

In retrospect, BFN management agrees that the use of a TACF for authorizing and controlling this work may have enhanced management controls. PORC will follow-up on this response and will use this experience in evaluating MR applicability on future work involving temporary alterations.

6. NRC concern - When wires were found reversed and unlabeled, no CAQR was initiated to document the problem and control resolution of the deficiency.

TVA action or plan - TVA does not agree this is an item of concern. No CAQR was needed as a condition adverse to quality was not judged to exist. This review was performed at the time the potential problem was identified and was reviewed again with responsible management after NRC expressed their concern. The same conclusion was reached. The reversed wires were properly documented on MRs. However, TVA is evaluating further some related concerns to ensure that adequate attention is given to this type of work in the future and that the work is properly documented.

7. NRC concern - A significant number (53 percent) of the fire brigade members were not eligible for fire brigade duty due to training or medical deficiencies.

TVA action or plan - TVA agrees that the means of tracking and notifying management on individual fire brigade duty eligibility needed improvement. We now have a more rigorous method for ensuring that the Plant Manager, Operations Management, and Shift Engineers (or duty shift supervisors) are notified of operations' personnel fire brigade eligibility. Please note that all individuals who actually fought the drywell fire were qualified. BFN does maintain on each shift the required number of qualified fire brigade members.

In regard to the 53 percent of fire brigade members not being eligible, we need to explain that the list provided to your inspector included names of personnel who did not need to have up-to-date training for fire brigade response. Included, as a significant percentage of our list, were Reactor Operators who were assigned administrative and supervisory duties for Operations Management and thus would not need current fire brigade qualifications.

8. NRC concern - Temporary electrical connections were made for the purpose of restart testing. This practice was probably unnecessary and should be discouraged.

TVA action or plan - TVA agrees that temporary electrical connections should be used sparingly, after due consideration, to support restart testing. In this case, the temporary connections were justified. The connections were made to support troubleshooting and corrective maintenance MRs on the drywell blowers. Additionally, the blowers were to be used as electrical loads for restart testing of the emergency diesel generators.

9. NRC concern - Welding leads are routinely energized and left unattended in the drywell.

TVA action or plan - TVA does not agree this is an item of concern. The BFN Modifications craftsmen have one crew of electricians assigned to install and maintain welding leads for all crafts. At the beginning of each shift they only turn on machines needed for that shift's work, and at the end of the shift, this same crew turns off all of the welding

machines. TVA feels this provides adequate assurance of safety from inadvertent fires being caused by an unattended welding lead. In addition, it has been re-emphasized to the individual crafts and their foremen de-energize welding machines anytime the machine is not in use.

10. NRC concern - Fire brigade members wasted valuable time while dressing out in radioactive contamination protective clothing instead of rapidly donning fire protection "turn-out" gear. The turn-out gear in all probability provides equal or better protection from radioactive contamination.

TVA action or plan - TVA agrees with this concern. Present procedures do allow the fire brigade to enter c-zone in turn-out gear, and this will be re-emphasized in the future fire brigade training classes. However, in section 6, page 7 of the NRC report, it was noted "Response by the fire brigade was timely and the operations staff was effective in extinguishing the fire and limiting fire damage to a small area in the drywell."

11. NRC concern - Maintenance records were inaccurate for documenting the cable splicing of the temporary drywell equipment power connections. Not all of the splicing that occurred was recorded, and the completion dates were not always the dates that the work was actually performed.

TVA action or plan - TVA agrees with the basis of this concern. Investigation of this concern indicated several signoffs were left blank on the MR which should have been marked not applicable or signed off at the time the work was complete. We have carefully evaluated the concern of not recording completion dates on the date the work was actually performed and feel this is not a deficiency. This work was done inside the drywell and documentation was signed off outside the drywell within a reasonable period of time. Management has stressed that signatures for inspection of work performed should be made as soon as possible after the work is complete. Since this work was performed inside the drywell and the documentation must be completed outside the drywell, some of the data sheets were signed at a later date than when the work was performed. TVA feels this is not a condition adverse to quality.

12. NRC concern - Vendor identification tags are not securely attached to penetration pigtailed. Temporary linen tags used for conductor identification should be evaluated for acceptability due to fire load.

TVA action or plan - TVA does not agree this is an item of concern. The vendor identification tags which are sleeves on the ends of the conductors have in some cases slid off during storage or installation. When these vendor identification tags are discovered to be missing as part of the installation, the conductor identification number is reverified by inspection and continuity tests, and retagged per plant instruction. After the conductor is installed, the vendor identification tag will not slide off. The use of linen tags for temporary identification of the conductors is acceptable per MAI-44 and MAI-45. The work instruction requires the use of linen tags for temporary identification until the conductors are terminated permanently. Linen tags are not used for permanent identification.

The present transient fire loading program, "Attachment C, Guidelines For Control Of Transient Fire Loads at BFN," addresses any fire loading which does not exceed the low fire load quantities. Because of the small quantities involved with these tags, additional fire protection control was not required in this instance.

13. NRC concern - An engineer's decision to check cable continuity both inside and outside the drywell was overruled by management (MR A-822017). This event potentially led to incorrectly terminated cable conductors.

TVA action or plan - The engineer's decision was not overruled as the concern states. MR-A822017 was written to support the checking of cable continuity inside and outside the drywell. Proper cable termination inside the drywell was previously checked by MR-A793993. The only cable left to check was the one outside the drywell which was checked by MR-A822017. The engineer was not aware that the work on MR-A793993 had been performed.

14. NRC concern - Electricians training may not be adequate for checking "cross-talk" between conductors, while performing continuity checks.

TVA action or plan - BFN craft supervision is responsible for ensuring that journeymen electricians used from the International Brotherhood of Electrical Workers are qualified to perform the skills of the craft activities. These activities include installing conduit, pulling cables, talking out cables, and identifying cables. BFN requires special training classes before electricians can perform specialized activities such as Raychem splicing of cables or soldering. The above concern has been evaluated and the use of the skilled craftsmen with supervisory overview is sufficient. No additional training is planned for continuity checks. However, electrical foreman and craft management will continue to review the individuals' abilities to assure they can adequately perform assigned jobs.

15. NRC concern - Numerous craftsmen worked on the same job (temporary power connections) through penetration EE over a two week period without proper turnover or communication awareness.

TVA action or plan - TVA does not agree this is an item of concern. TVA agrees that numerous craft personnel worked on this particular job inside the drywell. Two electricians are all that could work on penetration EE at a time due to limited space. Various electricians are rotated to support radiological ALARA considerations. However, only one general foreman and one engineer were assigned responsibilities for the temporary connection at penetration EE. This general foreman and engineer ensured a proper shift-to-shift turnover was conducted. TVA typically uses supervisors and engineers for shift-to-shift turnover and this is acceptable.



16. NRC concern - The practice of using an ice pick probe to insert into Raychem splices to check for continuity should be evaluated for acceptability by the licensee.

TVA action or plan - This was a temporary installation and there were no plans to make it permanent. Some confusion may have existed as to whether this was a permanent installation. In accordance with good engineering practice, the work instruction given by the engineers to the craftsmen was in agreement with permanent installation criteria. The use of Raychem for splicing was not necessary but was only enhancement for quality. A probe was stuck into the termination insulation to check continuity.

After the continuity check, a strip of Scotch 33+ tape was put over the probe hole to protect the termination. If this type of check had been performed on a permanent "Raychem" installation, it would have invalidated the installation and a new Raychem termination would have had to be performed. Since these were temporary connections and the Raychem was used only as electrical insulation for the connection, we feel there are no further actions necessary on this concern.

17. NRC concern - Electrical testing of circuit breakers did not include all breaker components to verify operability status. This is a generic concern.

TVA action or plan - TVA agrees with this concern. As a result of this concern, a starter testing procedure now exists to ensure that starters will be tested periodically with the breakers. BFN has checked with Sequoyah and found that their breaker testing does include motor starter testing for certain critical valves and we will make them aware that NRC's concern is for all safety-related starters. Watts Bar Nuclear Plant's breaker testing does not include starter testing other than initial construction testing, and we will make them aware of the need.

18. NRC concern - The plant operators have no quick reference drawing to determine power distribution through drywell penetrations. Days after the fire questions still existed as to whether all power in the area was secured.

TVA action or plan - TVA agrees with this concern. BFN does have drawings available to determine power distribution. These drawings consist of penetration assignment drawings that show the penetration name, inboard and outboard cable numbers, wire numbers, end service device, and connection drawing. However, multiple connection drawings must be used to locate power sources. BFN operations and design management are working towards a resolution of this concern.