TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401

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JAN 15 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-OIE INSPECTION REPORT NOS. 50-259/87-37, 50-260/87-37, AND 50-296/87-37 - RESPONSE TO NOTICE OF VIOLATION

Enclosed is TVA's response to the letter from K. P. Barr to S. A. White dated December 3, 1987, which transmitted the subject inspection report. This report cited TVA with three violations.

Enclosure 1 provides TVA's response to the violations. A list of commitments is provided in enclosure 2. We do not recognize any other items described herein as commitments. An extension of the due date of this response to January 15, 1988 was agreed to by Ken Ivey of your staff on December 30, 1987.

If you have any questions, please telephone N. C. McFall at (205) 729-2046.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

R. Gridley, Director
Nuclear Licensing and
Regulatory Affairs

Enclosures
cc: See page 2

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U.S. Nuclear Regulatory Commission

JAN 15 1988

cc (Enclosures):
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ENCLOSURE 1

RESPONSE
NRC INSPECTION REPORT NOS.
50-259/87-37, 50-260/87-37, 50-296/87-37
LETTER FROM K. P. BARR TO S. A. WHITE
DATED DECEMBER 3, 1987

Violation A

10 CFR 50, Appendix B, Criterion V requires that activities affecting quality shall be prescribed by instructions or procedures of a type appropriate to the circumstances.

Contrary to the above, the requirement was not met in that Browns Ferry Standard Practice 14.4, Drilling, Chipping, or Altering Concrete or Masonry and Excavation, dated October 15, 1985, contained an inadequate methodology for computing secondary containment in-leakage resulting from core drilling operations. The Standard Practice indicated that a 6-inch diameter hole through the 4.5 foot thick reactor building wall could be modeled as a square-edged orifice in an infinite diameter pipe. Basic engineering fundamentals as contained in the licensee's reference material for this type of calculation (Crane Technical Paper No. 410, Flow of Fluids Through Valves, Fittings and Pipe) would require this situation to be modeled as a 4.5 foot length of 6-inch diameter pipe.

TVA Response

1. Admission or Denial of the Alleged Violation

   TVA denies the violation.

2. Reasons for Denying the Violation

   Technical specifications require that before refueling, the ability of secondary containment to maintain 1/4 inch of water vacuum under calm wind conditions (<5mph) with a system leakage rate of not more than 12,000 cubic feet per minute (cfm) must be proven. This is done by performing surveillance instruction 4.7.C which measures the amount of flow needed to maintain 1/4 inch of water vacuum. If this flow is less than 12,000 cfm, the difference between this measured flow and 12,000 cfm is the remaining margin. With the use of administrative controls, this margin allows holes to be made in the secondary containment boundary if the calculated flow through the hole is less than the remaining margin. Therefore, the calculation method that gives the highest flow through the hole is the most conservative method. It is the opinion of TVA that the current method for calculating secondary containment in-leakage is a conservative approach that is in accordance with basic engineering fundamentals.

   Air flow through a hole in the secondary containment boundary is from a very large area (outside atmosphere, turbine building, or control building) through a relatively very small area (the hole), then to a very large area (reactor building). The flow equation used to model this is

the square edged orifice. This equation is accurate for relatively thin orifice plates (i.e., holes in secondary containment through thin walls such as sheetmetal refuel floor zone covering), and reasonably accurate where the ratio of the length of the hole to the diameter of the hole (L/D) is less than or equal to 2.5, (as stated in Crane Technical Paper 410, copyright 1980). If this criteria cannot be met, as in the case for thick walls, the use of the orifice equation is acceptable based on the following considerations.

The orifice equation has two terms that are used to calculate the flowrate based on the fluid conditions and the velocity of the fluid. The first term is an expansion coefficient and is used to account for the compressibility of the gas as it passes through the opening. TVA is using an expansion coefficient of 1.0 which treats the fluid as incompressible. This is conservative since it does not take credit for the reduced density of the fluid in the penetration and causes the flow rate to be maximized. The other factor is the flow coefficient, C, which is an empirical datum taken from Crane Technical Paper 410. Browns Ferry Standard Practice 14.4 gives a C value of 0.5. However, the value actually used in the calculation is 0.7 which is the maximum possible value for pipe and orifice diameter ratios from 0.0 to 0.2 (Crane Technical Paper 410, page A-20) for any Reynold's number value. For Reynold's numbers present for flow into the BFN secondary containment a C value equal to 0.6 could be used. Thus the value chosen is conservative. The C value of 0.5 in Browns Ferry Standard Practice 14.4 will be changed to 0.7 to agree with the value actually being used to compute secondary containment in-leakage.

TVA calculated the flow through the wall using an entrance loss, an exit loss, and an fL/D term for a 4.5 foot long 6-inch diameter concrete pipe. The terms used for this are based on incompressible flow and uniform velocity profiles through the pipe. Neither of these conditions would be present since air is compressible and in such a short pipe length the velocity profile would show the effects of the entrance when it reached the exit. If properly accounted for these effects would reduce the calculated flow rate. This technique is also described in Crane Technical Paper 410.

A comparison of the volumetric flow through the secondary containment as calculated by the orifice equation and the pipe flow method showed both calculations produced results within five percent of one another. Given the conservatisms in both calculations it is concluded that the use of the orifice equation with the current flow coefficients is conservative and therefore acceptable.

Violation B

10 CFR 50, Appendix B, Criterion XIV requires that measures shall be established for indicating the operating status of structures, systems and components of the nuclear power plant such as by tagging valves and switches to prevent inadvertent operation.

Contrary to the above, the requirement was not met on October 13, 1987, when Residual Heat Removal (RHR) pump suction valve 2-FCV-74-24 was inadvertently operated by a reactor operator. Maintenance personnel had released the valve from a clearance hold order for manual operation only on or about September 14, 1987, under the provision that the valve was not suitable to have electrical power restored. Following completion of the activity which required manual operation of the valve, the restriction over electrical operation was not maintained by tagging switches or any other mechanism. As a result, power was subsequently restored to the valve and when the operator positioned the control switch to close the valve, its disc was driven against the seat until its associated breaker tripped on overload.

TVA Response

1. Admission or Denial of the Alleged Violation

   TVA admits the violation.

2. Reasons For the Violations if Admitted

   A procedure deficiency exists in the BFN clearance procedure because it does not allow for temporary lifting of a hold order tag. This would have allowed the electricians to release only the tag associated with manual valve operation rather than the entire hold order.

   Poor judgment by operations was also a factor in this incident. The hold order on the valve was released before the electrical work on the valve had been completed so that a hydrostatic test could be run. Almost one month had elapsed from the time the electricians released the hold order because of delays in hydrostatic testing. During this delay, the fact that the electricians had not completed setting the limit switches was forgotten.

3. Corrective Steps Which Have Been Taken and Results Achieved

   A clearance was issued on valve 2-FCV-74-24. The valve was determined not to have been damaged and has since passed a leak test.

4. Corrective Steps Which Will Be Taken to Avoid Further Violations

   The BFN clearance procedure will be revised to allow for temporary lifting of a hold order tag. BFN operations personnel will be required to review this violation response and the operations critique written to discuss this incident.

5. Date When Full Compliance Will Be Achieved

The BFN clearance procedure will be revised by March 31, 1988 to allow for temporary lifting of hold order tags. BFN operations personnel will review this violation response and the operations critique written to discuss this incident by March 18, 1988.

Violation C

10 CFR 50, Appendix B, Criterion XII requires that measures shall be established to assure that tools, gauges and instruments used in activities affecting quality are properly controlled, calibrated and adjusted to maintain accuracy within necessary limits.

Contrary to the above, an instrument mechanic improperly adjusted pressure gauge E82214 which was being used in a post-modification test instruction on instrumentation used by the Reactor Protection System and Emergency Core Cooling System. The zero adjust screw on the pressure gauge was erroneously adjusted during the performance of step 5.4.12.18 of PMT-116, Rosemount Trip Calibration System on October 6, 1987. The only authorized adjustment of the gauge is during a multi-point calibration procedure traceable to the National Bureau of Standards.

TVA Response

1. Admission or Denial of the Alleged Violation (or Finding)

TVA admits the violation.

2. Reasons For the Violations if Admitted

Training for BFN instrument mechanics in the use of Wallace & Tiernan pressure gauges was inadequate so that the instrument mechanic believed it was an acceptable and allowable practice to zero adjust the pressure gauge in the field prior to use. This is acceptable for some types of Measuring and Test Equipment (M&TE) pressure gauges but not for those manufactured by Wallace & Tiernan. For these gauges the pointer of the gauge pressure instrument is not necessarily at an exact zero when the instrument is shipped from the factory. However, the deviation is never outside the guaranteed accuracy. The offset is adjusted to attain optimum accuracy over the full scale.

The instrument mechanic should have exercised the instrument over the full range, allowed it to remain there about two minutes, and then released pressure allowing the pointer to return to zero. This should be repeated twice. If the pointer deviation from zero is within that specified on the label, no adjustment is necessary. However, if the pointer deviation from zero does not agree with the indicated offset, the instrument should be returned to the standards laboratory for a calibration check.

3. Corrective Steps Which Have Been Taken and Results Achieved

The BFN instrument mechanics have been required to review the proper actions when using Wallace & Tiernan pressure gauges.

4. Corrective Steps Which Will Be Taken to Avoid Further Violations

A survey of all BFN M&TE will be performed to determine any prerequisites to use such as those for Wallace & Tiernan pressure gauges. A system will be developed to alert instrument mechanics of these prerequisites.

5. Date When Full Compliance Will Be Achieved

A survey of all BFN M&TE will be performed and a system will be developed to alert instrument mechanics of prerequisites by March 1, 1988.

ENCLOSURE 2

LIST OF COMMITMENTS

Violation A

None

Violation B

The BFN clearance procedure will be revised by March 31, 1988 to allow for temporary lifting of hold order tags. BFN operations personnel will review this violation response and the operations critique written to discuss this incident by March 18, 1988.

Violation C

A survey of all BFN M&TE will be performed and a system will be developed to alert instrument mechanics of prerequisites by March 1, 1988.