TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401

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JUL 20 1987

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 UNITS 1, 2, AND 3 - NRC OIE INSPECTION REGION II INSPECTION REPORT NOS. 50-259/87-14, 50-260/87-14, AND 50-296/87-14 RESPONSE TO VIOLATION

Enclosed is TVA's response to the letter from G. G. Zech to S. A. White dated June 15, 1987, which transmitted IE Inspection Report Nos. 50-259/87-14, 50-260/87-14, and 50-296/87-14 for TVA's Browns Ferry Nuclear Plant units 1, 2, and 3. This report cited TVA with one Severity Level IV Violation, 50-259, 50-260, 50-296/87-14-02, "Failure to comply with the operability requirements of Technical Specification 3.7.E, Control Room Emergency Ventilation System (CREVS)." Our response to this violation is contained in enclosure 1. Enclosure 2 addresses the timeliness aspect of identifying the low flow condition on the B train CREVS. A list of commitments is provided in enclosure 3.

An extension of this response submittal due date to July 21, 1987 was agreed to in a telephone conference call with Al Ignatonis of your staff on July 14, 1987.

Please refer any questions to M. J. May, Manager of Site Licensing, Browns Ferry Nuclear Plant, at (205) 729-3566.

To the best of my knowledge, I declare the statements contained herein are complete and true.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

R. Gridley, Director
Nuclear Safety and Licensing

Enclosures
cc: See page 2

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U.S. Nuclear Regulatory Commission

JUL 20 1987

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ENCLOSURE 1
RESPONSE
NRC INSPECTION REPORT NOS
50-259/87-14, 50-260/87-14, AND 50-296/87-14
LETTER FROM G. G. ZECH TO S. A. WHITE
DATED JUNE 15, 1987

VIOLATION

Technical Specification 3.7.E requires that the Control Room Emergency Ventilation System (CREVS) flow rate shall be shown to be within plus or minus 10% of design flow when tested in accordance with ANSI N510-1975 and that when neither one of the two CREV trains are operable, refueling operations shall be terminated within two hours.

Contrary to the above, the requirements were not met in the following two examples:

1. The licensee discovered on March 2, 1987, that the B train CREV flow rate was and had been 20% below the design flow for a period in excess of several years. The condition existed because of an erroneous flow test method contained in Surveillance Instruction 4.7.E.5, Control Room Emergency Ventilation System Flow Rate Test. This method indicated a flow rate of about 530 SCFM whereas actual system flow when accurately measured was about 400 SCFM. CREV design flow is 500 SCFM.

2. The licensee conducted refueling operations on March 2, 1987, for a period in excess of two hours while both CREV trains were inoperable. Train A was made inoperable at 6:20 a.m. for maintenance while train B was simultaneously inoperable for a low flow condition since 6:30 p.m. on March 1, 1987.

This is a Severity Level IV Violation and is applicable to all three units.

EXAMPLE 1 RESPONSE

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

TVA admits the violation.

2. Reasons For the Violations (or Finding) if Admitted

Technical specification 3.7.E requires that the Control Room Emergency Ventilation System (CREVS) flow rate shall be shown to be within ± 10 percent of design flow rate when tested in accordance with American National Standards Institute (ANSI) N510-1975. The preferred flow measurement method per ANSI N510-1975 is to perform a pitot tube traverse using an inclined manometer in a section of the duct where the velocity is 1,000 fpm, or more, and at least 7.5 duct diameters downstream of any air flow disturbance. The design of the CREVS train "B" is such that the air velocity inside the duct work is less than 1,000 fpm; additionally, no location exists that is at least 7.5 duct diameters downstream of an air flow disturbance.

ANSI N510-1975, Section 8.3.1, allows use of other methods as described in Section 9 of the American Conference of Governmental Industrial Hygienists (ACGIH) manual in cases where the duct design does not meet the requirements for performing a pitot tube traverse in conjunction with an inclined manometer. One such other method endorsed by the ACGIH manual is the use of a vane anemometer. With the aforementioned facts in mind, an initial engineering decision was made to measure the flow rate at the outlet of the CREVS unit using a rotating vane anemometer. Based on the information known at the time, the judgement was considered sound. The use of a rotating vane anemometer was not considered to be an erroneous flow test method; however, recent investigation revealed that CREVS "B" flow measurements taken with the vane anemometer were significantly different from flow measurements obtained with a pitot tube/micromanometer. The pitot/micromanometer combination is also considered acceptable for velocities less than 1,000 fpm. Although the CREVS "B" traverse plane is in a curved section of duct, experimental data revealed a reasonable flow profile. The good flow profile in conjunction with the sensitivity of the micromanometer made the pitot/micromanometer a better measuring method for this application than the anemometer.

This more accurate flow measuring method did reveal that the flow rate had been set low. The root cause was duct work configuration that allowed a choice of flow measuring techniques. Had the duct work been constructed to meet ANSI N510-1975 flow testing requirements, there would not have been as much difference between approved techniques used to measure flow rate. Not realizing the potential for such a significant difference, test personnel originally chose a flow measuring method that has since proven less accurate than the current method for this application.

3. Corrective Steps Which Have Been Taken and Results Achieved

Surveillance Instruction (SI) 4.7.E was revised before this violation to measure the flow rate, using a pitot tube/micromanometer combination. When the revised SI was performed, the outlet damper was adjusted to obtain the desired flow. The flow rate is now more accurately set within the prescribed tolerance of 500 ± 10 percent cfm with the valve lineup currently in use in the SI.

4. Corrective Steps Which Will Be Taken to Avoid Further Violations (or Findings)

TVA has undertaken a system review for the CREVS. As a result of this review, a question as to the proper valve lineup to be utilized in SI 4.7.E.5 to verify the flow rate of 500 cfm has arisen. Because of this, a special test has been written, approved, and is planned to be performed in the near future. This test will verify the adequacy of the existing SI to correctly set the damper positions required to support postaccident ventilation valve alignment. Additionally, the Restart Test Program will perform a test before restart in which the capability of the CREV to pressurize the Control Building to a positive pressure will be demonstrated. Techniques for measuring flow rate on other technical specification systems have been reviewed in light of this violation and deemed satisfactory. These corrective actions are currently scheduled to be complete before the start of loss of power (LOP)/loss of coolant accident (LOCA) tests, both of which are restart tests required for unit 2 startup.

5. Date When Full Compliance Will Be Achieved

BFN's schedule required that the above corrective actions be complete before the LOP/LOCA restart test which is currently scheduled for December 1, 1987.

EXAMPLE 2 RESPONSE

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

TVA admits the violation.

2. Reasons For the Violation (or Finding) if Admitted

On March 1, 1987, the micromanometer utilized to measure Control Room Emergency Ventilation System (CREVS) "B" air flow was improperly zeroed, resulting in the flow being incorrectly set. The flow rate should be set at 500 cfm ± 50 cfm but was set at 395 cfm. Incidents leading to the event were as follows.

March 1, 1987

During performance of Surveillance Instruction (SI) 4.7.E.5, CREV "B" flow rate was measured utilizing a pitot tube and micromanometer. This was the first time the micromanometer had been used to perform the SI. The micromanometer was zeroed and measurements performed. The throttle damper was moved slightly open from the as-found position to achieve an indicated flow rate of 474 cfm. This flow rate is within the 500 ± 50 cfm SI acceptance criteria. At 1830 hours, the test personnel turned CREVS "B" over to Operations. Following a 10-hour test run, Operations declared CREVS "B" operable at 0600 on March 2, 1987. At 0620, CREVS "A" train was tagged out of service for inspection.

March 2, 1987

While reviewing test data, lead test personnel identified that the damper position was moved to obtain the desired flow and questioned test personnel as to the previous day's test. After discussions with test personnel, it was decided to determine the flow rate of the as-found damper position. Due to CREVS "A" being taken out of service for inspection, Operations would not allow movement of the CREVS "B" throttle damper. However, per the system engineer's request, flow measurements of CREVS "B" were made with pitot tube and micromanometer to compare with measurements made with the vane anemometer. This was requested because the vane anemometers were suspected of giving measurements significantly different from the micromanometer. These measurements made with the pitot tube and micromanometer indicated a flow rate of 395 cfm.

Discussions with test personnel revealed that the micromanometer had been zeroed the previous day by pinching off both sensing tubes instead of allowing each sensing tube to see atmospheric pressure. Difficulty in keeping the micromanometer level during the test was also reported. It is believed that a bias was introduced to the micromanometer due to trapping a differential pressure (pinching the tubes) or from inadequate leveling.

Upon confirmation of the CREVS "B" flow being incorrectly measured and subsequently set wrong, Operations was notified the CREVS "B" was inoperable due to low flow rate.

After the discovery, the flow was immediately measured and correctly set. However on the morning of March 2, 1987, when CREV "B" was believed operable, four new fuel bundles were moved to the refuel floor and placed in the unit 1 spent fuel pool. Interpreting this fuel movement as a refueling operation, technical specifications relative to CREV operability were not satisfied even though the unit 1 reactor vessel and drywell heads were in place.

The error was made because previous practice runs using the micromanometer indicated that either method of zeroing (allowing both sensing tubes to see atmospheric pressure or pinching off both tubes) resulted in the same instrument zero. The technician believed that during the practice run on March 1, 1987, equal pressures were trapped within the tubes when they were pinched. It was not recognized how sensitive the micromanometer is to small pressure differentials caused by incorrect zeroing or leveling.

At the time an approved training procedure for use of the micromanometer did not exist. It was believed that existing procedures covering the use of standard manometers would suffice. Additionally, the engineering aide was led to believe during the practice runs that it was acceptable to zero the micromanometer by pinching off the tubes.

3. Corrective Steps Which Have Been Taken and Results Achieved

All filter tests were rerun at the correct flow rate and the train returned to service. The CREVS "B" flow rate was correctly measured and set immediately after Operations was notified. Personnel were instructed on the correct use of the micromanometer by lead test personnel. MRI 27, Pitot Tube - Manometer Training, has been revised to include instructions for proper use of the micromanometer.

4. Corrective Steps Which Will Be Taken to Avoid Further Violations (or Findings)

None required.

5. Date When Full Compliance Will Be Achieved

Full compliance has been achieved.

BFN management considers the actions taken to be timely based on the continuing focus of attention given the problem and continuing corrective actions. Listed below is a chronological summary of events followed by supporting discussions relative to the low flow condition of the B train of CREV.

DATE	EVENT
8-04-86	Concerns raised in NRC resident inspector's monthly exit meeting.
8-28-86	Technical Services Staff investigation completed and discussions held with resident inspectors.
9-10-86	NRC comments returned to Compliance and Technical Services on material presented at 8-28-86 meeting.
10-27-86	Immediate Temporary Change (ITC-06) processed for SI 4.7.E.5 to incorporate new flow test method, based on NRC concerns.
10-31-86	Additional discussions held with resident inspectors as a followup to previous meetings.
11-86	Administrative actions to complete procedure change
1-87	Permanent Procedure change completed for SI 4.7.E.5 to incorporate new test methods
3-87	Summary of events on CREVS given to NRC resident inspectors after concerns of what had been done were expressed.
6-09-87	Plant Operation Review Committee approved Special Test 8726 "Gather Flow Rate Data from Various Control Bay Ventilation System's Line ups through the CREVS Units A & B"

Based on NRC Resident Inspector concerns in August 1986, the Mechanical Test Section performed a comparison of different flow measuring instruments. The instruments used were the vane anemometer, hot wire anemometer, pitot tube in conjunction with an inclined manometer, and a flow hood. These comparisons did not indicate significant differences between the various measuring techniques. Based on this, there was no reason to believe the vane anemometer was inadequate for the application.

A dialogue was initiated by BFN Technical Services and Compliance Licensing with NRC resident inspectors throughout the months of August and September to try to resolve the finding. This involved several technical discussions. However, the unresolved item was not resolved to the inspectors' satisfaction and in September 1986, Unresolved Item 259/260/296/86-25-11 was upgraded to Violation 259, 260, 296/86-32-01. The violation addressed the train "A" CREVS concern (use of a pitot tube with velocity less than 1,000 fpm). TVA's

corrective action was to change from an inclined manometer to a micromanometer for flow rate measurement. Due to the initial comparisons of instruments not yielding significant differences, TVA decided that the procedural change was an adequate corrective action, and there was no reason to suspect the actual flow rates would not be acceptable. Therefore, it was decided not to perform the SI again and wait for the next scheduled flow test. These procedural changes were accomplished by an immediate temporary change in October with permanent instruction changes completed in January 1987.

During the next scheduled flow test for "B" train CREVS on March 1, 1987, a micromanometer was used during the performance of SI 4.7.E.5. On March 2, 1987, a senior test engineer discovered the flow rates to be unacceptable and had to adjust the damper. Also, the engineer immediately initiated subsequent reports per 10 CFR 50.72 and 50.73, as it was now apparent that the flows had been incorrectly set. The test engineer suspects that during the instrument comparisons, the vane anemometer was incorrectly calibrated thereby leading to the wrong conclusions when evaluating the results of the comparison tests.

TVA has recently undertaken a thorough system operational review for the CREVS. The results obtained from this review raised a question on system configuration and proper damper position to be utilized during the performance of SI 4.7.E.5. A special test has been written and approved which will give results used to correct the existing SI. This will ensure a correct postaccident ventilation fan and damper alignment, and the special test is scheduled as a prerequisite to unit startup.

ENCLOSURE 3
LIST OF COMMITMENTS

EXAMPLE 1

1. A special test will be performed to resolve the question on proper system configuration to be utilized in SI 4.7.E.5.

2. The Restart Test Program will perform a test to prove capability of CREV to pressurize the Control Room.

   BFN's schedule requires the above corrective actions to be complete before our LOP/LOCA restart test which is currently scheduled for December 1, 1987.