



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SEQUOYAH NUCLEAR POWER PLANT, UNITS 1 AND 2
SAFETY EVALUATION REPORT FOR EMPLOYEE CONCERNS
ELEMENT REPORT EN 231.5 (B)
"ADEQUACY OF BATTERY ROOM VENTILATION SYSTEM DESIGN"

1.0 INTRODUCTION

The issues defined by TVA are that the design of the ventilation systems for battery rooms are not adequate such that (1) hydrogen accumulates in the rooms, (2) the exhaust fans are subject to failure and, (3) resistance heaters installed in battery rooms could be ignition sources for hydrogen generated during battery charging.

2.0 EVALUATION

Category: Engineering (23100)
Subcategory: Fire Protection Design (23105)
Element: Adequacy of battery room ventilation system design
(231.5(B))
Employee Concerns: TAK-86-006
I-85-993-NPS

The basis for Element Report 231.5 (B), Rev. 4, dated January 22, 1987, are the Employee Concerns listed above which state:

TAK-86-006

"Vital battery room resistance heaters could be a potential ignition source in the event an exhaust fan failure allows accumulation of combustible gases generated during charging."

I-85-993-NPS

"The design of ventilation of battery rooms at SQN and WBN is not adequate."

These issues were evaluated by TVA as being applicable to Sequoyah and Watts Bar Nuclear Plants.

The TVA evaluation determined that:

- a. The installation of electric resistance heaters in properly ventilated battery rooms does not violate TVA commitments to the NRC, TVA design criteria or industrial codes.
- b. All battery room fans, except those for the diesel generators, are provided with backup fans and automatic switch over upon failure of the lead fan. Malfunction of these fans is annunciated in the main control room.
- c. The normal ventilation flow in the battery rooms is sufficient to maintain the average hydrogen concentration below half of the lower explosive limit (LEL) considered safe by an NRC Regulatory Guide. The time required to build up to this concentration with complete ventilation failure is ample for corrective action. Scheduled surveillance of battery and charger parameters would indicate overcharging of batteries and hence hydrogen generation before a hazardous concentration could be reached.
- d. A hydrogen survey confirmed that no pockets of higher concentration develop in the 250V and 125V vital battery rooms I through IV. No survey was conducted for the vital battery room V which is more prone to pocket formation. The DG battery exhaust hood would accumulate hydrogen if the exhaust damper failure closed followed by battery overcharging.

The TVA evaluation concluded that:

- a. No regulatory guide, TVA specification, or industrial standard is violated by the electric resistance heaters in the vital battery rooms. With the monitoring equipment available for the batteries, chargers, and redundant Class IE HVAC equipment, unnoticed loss of ventilation, and buildup of hazardous hydrogen concentration within the surveillance interval, will not occur. The ventilation flows are sufficient to keep the average hydrogen concentration below the safe 2 percent and provide customary air changes per hour.
- b. The issue relating to hydrogen accumulation in the vital battery rooms has some validity since pocketing in the fifth 125V vital battery room has not been discounted by a hydrogen survey and no scavenging holes are provided in the protruding exhaust duct. Also, the DG battery I through IV exhaust hoods may accumulate hydrogen upon the damper failing closed.

With regard to corrective actions, TVA has developed a corrective action plan which will result in 3/4 inch holes being drilled into the mounting frame of the DG battery vent hood exhaust fan discharge dampers (FCO 455 through FCO 458) and the vital battery V room exhaust damper frames (FCO31-485 and 487) near the ceiling. Sufficient holes will provide minimum natural ventilation in case of forced air interruption and will scavenge potential pockets of hydrogen without seriously compromising the function of the dampers. This is acceptable for restart.

3.0 CONCLUSION

The NRC staff believes that the resolution of the issues as described in Element Report 231.5(B) is acceptable. The TVA investigation of the concerns was generally adequate. However, several fire protection commitments pertaining to the battery room ventilation systems, as identified in TVA's letters to the NRC dated January 24, 1977 and March 8, 1979, were not referenced in the TVA evaluation. The NRC staff believes that while these commitments were not specifically identified in the element Report they were adequately addressed in the evaluation such that the conclusions drawn are still valid. During a telephone conversation between the NRC Region II staff (W. H. Miller and G. R. Wiseman) and TVA (G. R. McNutt) on March 31, 1987, TVA agreed to add these references to the Element Report and revise Element Report 231.5(B) accordingly.