



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 219 TO FACILITY OPERATING LICENSE NO. DPR-77
AND AMENDMENT NO. 209 TO FACILITY OPERATING LICENSE NO. DPR-79
TENNESSEE VALLEY AUTHORITY
SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2
DOCKET NOS. 50-327 AND 50-328

1.0 BACKGROUND

At the Sequoyah Nuclear Plant (SQN), Units 1 and 2, loss-of-voltage protection and degraded-voltage protection are provided to the 6.9 kilo-volt (kV) shutdown boards to ensure that adequate voltage is available to the safety-related loads. A loss of voltage or a sustained degraded-voltage condition will start the emergency diesel generator (EDG) that will be connected to the shutdown board after tripping normal and alternate feeders and shedding the major loads. The loss-of-voltage relays will provide the load-shedding functions and subsequently resequence the loads onto the EDG after the EDG has been tied to the shutdown board.

After the EDG has been connected to the shutdown board and the load-sequencing interval has been achieved, the loss-of-voltage, load-shedding function on the 6.9-kV shutdown board initiates a motor-driven auxiliary feedwater (AFW) pump start. Also, the load-shedding actuation immediately activates a turbine-driven AFW pump start. The reactor coolant pumps would not be available to provide forced coolant flow in the event of loss of voltage, but the early turbine-driven AFW pump start initiates natural circulation and heat removal in the reactor coolant system. The AFW pumps provide sufficient heat-removal capabilities to prevent the pressurizer from filling during design-basis accidents.

Tennessee Valley Authority (TVA) has been working with the Electrical Distribution System (EDS) Clearinghouse to establish guidelines for degraded-voltage analyses. These guidelines were developed by the EDS based on the review of all inspection findings and enforcement actions from the electrical distribution system functional inspections that were conducted by the NRC at most of the operating plants. The guidelines established by this effort have been applied to the SQN loss-of-power and degraded-voltage analysis and have led to changes of loss-of-power and degraded-voltage instrumentation. These changes will ensure that adequate voltage is available to the safety-related loads.

ENCLOSURE 3

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2.0 INTRODUCTION

By letter dated October 1, 1993, TVA initially proposed changing the SQN technical specification (TS) to incorporate revised setpoints and time delays for the AFW loss of power and the 6.9-kV shutdown board's loss of voltage and degraded-voltage instrumentation. These changes required a revision to the description, the total number of channels, the channels to trip, the minimum channels operable, the actions, the trip setpoints, the allowable values, the channel checks, and the channel functional test requirements for loss-of-power instrumentation. NRC approved the changes as Amendment Nos. 182 and 174 for SQN Units 1 and 2, respectively, by letter dated May 24, 1994. Subsequently, by letter dated August 19, 1994, the staff issued Amendment Nos. 188 and 180, for SQN Units 1 and 2, respectively, that allowed delay of the implementation date. This implementation date was again revised as Amendment Nos. 207 and 197, for SQN Units 1 and 2, respectively, by letter dated August 22, 1995. No changes, other than the implementation date, was addressed by these latter amendments. Even though the amendments were approved, the design changes have not yet been implemented.

Subsequent detailed evaluations by TVA involving implementation of these modifications, indicated that a significant impact on the TS allowed outage times (AOTs) for the EDG existed, since they would require that the safety functions to be taken out of service longer than desired. Therefore, in a letter to NRC dated December 8, 1995, TVA submitted additional modifications to the design and further changed the setpoints and the time delays for the AFW loss of power and the 6.9-kV shutdown board's loss of voltage and degraded-voltage instrumentation in Items 6 and 7 of TS Table 3.3-4, respectively.

3.0 EVALUATION

The following proposed changes pertain to the TS of both Unit 1 and 2 unless otherwise stated.

Change 1: Item 6.e of TS Table 3.3-4 would be revised to change the allowable values for the voltage sensor to ≥ 5331 volts. The allowable value for the EDG start and load-shedding timer would be changed to 1.25 ± 0.25 seconds.

Change 2: Item 7.a of TS Table 3.3-4 would be revised to change the allowable value for the voltage sensor to ≥ 5331 volts. The allowable value for the EDG start and load-shedding timer would be changed to 1.25 ± 0.25 seconds.

Change 3: Item 7.b of TS Table 3.3-4 would be revised to change the allowable value for the voltage sensor to ≤ 6595.5 volts. The allowable value for the EDG start and the load-shedding timer would be changed to ≤ 370 seconds. The trip setpoints for the safety injection/degraded voltage logic enable timer would be changed to 9.5 seconds. The allowable value for the safety injection/degraded voltage logic enable timer would be changed to 9.5 ± 2.0 seconds.

These design changes for the proposed voltage protection scheme have been revised from the original submittal. The design changes are being made to

minimize the impact of AOTs on operating equipment and safety functions, and reduce the length of time the equipment is removed from service during the implementation process. The following changes were made to the original amendment.

In the original design, the degraded voltage load-shedding function was disabled after the EDG was tied to the shutdown board as the sole supply. The revised design will maintain the current design logic that will initiate load shedding on a degraded voltage condition only if the EDG voltage level drops below the 70-percent voltage limit of the auxiliary relay for the emergency supply breaker or if this breaker trips. The new design will include a 1.25 second delay prior to load shedding at the 70 percent voltage level as a result of the delay associated with 80 percent voltage level loss-of-voltage relays. At the 70 percent voltage level, motor heating could be a problem for continued operability and allowing the EDG to re-establish its safety function through load shedding at this voltage level may enhance long-term operability requirements for some accidents.

The timers remain the electro-pneumatic type instead of the electronic version previously proposed. This requirement applies to both degraded-voltage and loss-of-voltage timers.

The voltage sensing for the loss-of-voltage relays will be moved to the shutdown board as previously proposed; however, the relays will actuate only one pair of timers, utilizing a one-out-of-two logic scheme, to initiate EDG start and load shedding, thus eliminating a second pair of timers. The second pair of timers, which was previously designed to provide a 10 second time delay for loss-of-voltage conditions when the EDG is the sole supply to the shutdown board, was removed from the voltage protection scheme. As previously discussed, the loss-of-voltage function will only operate if the EDG voltage level drops below the 70 percent limit of the auxiliary relay for the emergency supply breaker, or if this breaker trips.

TVA is proposing these setpoint revisions and the revised design for the voltage protection scheme to support an implementation plan that will not adversely affect safety functions or require significant extensions of the AOT for TS-required equipment.

The staff has reviewed the licensee's calculations to determine if at the proposed trip values and allowable values for the undervoltage relay settings adequate voltage can be provided at the terminals of all engineered safety features equipment. Adequate voltage is necessary to perform safety functions and to ensure that the time delay would not exceed the maximum time delay that is assumed in the accident analyses in the final safety analysis report. The staff has concluded that the proposed trip values and time delays for the undervoltage relays will protect the Class 1E equipment from sustained degraded voltages under accident and other conditions and that the proposed scheme conforms to the Branch Technical Position PSB-1. These changes are, therefore, acceptable.

4.0 CONCLUSION

The revised design and setpoints will continue to provide for a voltage protection scheme that will ensure adequate voltage for accident mitigation functions. The revisions proposed in this submittal do not adversely affect the plant responses for postulated accidents from those proposed in the previous change request. The equipment reliability, capability, and functionality have not been affected by these revisions. By incorporating these setpoint revisions and the revised design for the voltage protection scheme, TVA supports an implementation plan that will not adversely affect safety functions or require significant extensions of the AOl for TS-required equipment. We find the proposed revised setpoints and time delays for the loss-of-power instrumentation acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Tennessee State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (61 FR 181). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: S.K. Mitra

Dated: March 1, 1996