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April 27, 1992

U.S. Nuclear Regulatory Commission  
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Gentlemen:

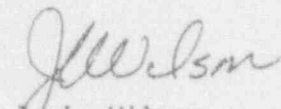
In the Matter of ) Docket Nos. 50-327  
Tennessee Valley Authority ) 50-328

SEQUOYAH NUCLEAR PLANT (SQN) - FACILITY OPERATING LICENSES DPR-77 AND  
DPR-79 - ENVIRONMENTAL QUALIFICATION - SPECIAL REPORT 91-15, REVISION 2

The enclosed revision to the special report provides the current schedule for completing the necessary qualification documentation revisions. The extended duration has resulted from consolidation of related work activities; results obtained to date continue to support the initial operability basis. The original special report was submitted in accordance with Units 1 and 2 License Condition 2.H. Revisions to the special report are annotated by vertical bars in the right-hand margin.

If you have any questions concerning this submittal, please telephone M. A. Cooper at (615) 843-8422.

Sincerely,

  
J. L. Wilson

Enclosure  
cc: See page 2

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ENCLOSURE  
14-DAY FOLLOW-UP REPORT  
SEQUOYAH NUCLEAR PLANT (SQN)  
SPECIAL REPORT 91-15, REVISION 2

Description of Condition

On August 1, 1991, with Units 1 and 2 operating in Mode 1, a significant corrective action report (SCAR) was initiated to document that the calculated, free-field beta radiation doses that were used to environmentally qualify safety-related equipment housed in small unsealed enclosures inside containment were nonconservative. This condition was subsequently determined to be reportable on August 12 under License Condition 2.H of the Units 1 and 2 operating licenses.

The beta radiation input for the environmental qualification of SQN equipment is based on a generic calculation generated by TVA corporate Nuclear Engineering in 1986. The calculation determined a reduction factor to be applied to the free-field beta dose to components inside unsealed enclosures utilizing an "effective infinite cloud" reference volume. This reference volume was based on the possible spectrum of beta energy levels, the associated probabilities of a given beta particle having a specific initial energy, and the range in air that a beta particle can travel at a given energy. SQN-specific calculations then applied the reduction factor from the generic calculation to determine a free-field beta radiation dose for that component inside the enclosure.

As a result of a recent calculation review, the generic beta radiation doses were recalculated utilizing a state-of-the-art statistical prediction model that utilizes Monte Carlo methodology. This method yielded higher free-field beta radiation doses for equipment than had the original generic calculation. The impacted equipment includes safety-related cables, splices, terminal blocks, penetrations, transmitters, and safety-related mechanical valve seats.

Cause of Condition

The cause of this condition has been concluded to be the result of the failure of the personnel involved in the original generic beta dose calculation to realize that the linear reduction methodology used provided nonconservative results. Personnel involved in the preparation and verification of the calculation had no comparable methodology readily available to assess the accuracy or validity of the calculation results. They primarily relied upon their experience in radiation analyses in reviewing the calculation.

The generic calculation was also reviewed as part of the restart efforts for SQN and Browns Ferry Nuclear Plant (BFN). These reviews encompassed several aspects, including appropriate reference material, acceptable methodology, numerical correctness, and assurance that results were in accordance with the problem statement. As no standard criteria to compare the methodology or the results were readily available, the reviewers relied on industry experience to draw the conclusion that the calculation was acceptable.

### Corrective Actions

Upon identification of the nonconservative beta dose values, a review of 10 CFR 50.49 equipment qualification records was performed. Evaluations have been performed for the affected equipment, and it has been concluded that the equipment is qualifiable and capable of performing its design function. Site-specific calculations and qualification records to reflect the higher beta doses have not yet been performed.

An assessment of cables and splices was performed by evaluating a detailed Monte Carlo analysis for exposed cables at EFN. This calculation allowed EFN to qualify cables to a much greater airborne free-field beta dose. By adjusting the results of the EFN calculation to that of SQN (adjusting for SQN's specific containment volume and power level), values for the expected beta dose for SQN were determined for unjacketed cables and splices inside unsealed enclosures. These values lead to the conclusion that the SQN cables and splices are qualifiable.

For exposed cables, the NRC methodology provided in Inspection and Enforcement Bulletin 79-01B, "Environmental Qualification of Class 1E Equipment" (Enclosure 4, Section 4.1.2), along with crediting operating time requirements, supports qualification.

Terminal blocks were determined to be qualifiable utilizing the new volume reduction factors computed in the revised generic beta dose calculation.

A review of the calculations performed for the mechanical valve internals shows considerable conservatism in their preparation. Consideration of the new reduction factors will not change the qualification status of the valves affected.

All other 10 CFR 50.49 components affected by the revised volume reduction methodology are qualifiable considering the revised volume reduction factors, shielding considerations, required operating times, and radiation thresholds of the component material.

Based on the above discussions and engineering judgement, all 10 CFR 50.49 equipment impacted by the new beta dose reduction factors remain qualifiable and continues to remain capable of performing its intended design functions. As such, no operability concerns exist. A detailed corrective action plan has been developed to revise the appropriate 10 CFR 50.49 qualification documentation. The necessary documentation revisions will be completed by July 31, 1992.

### Commitments

1. The schedule for completing these documentation revisions will be provided in a revision to this special report by November 1, 1991 (completed by Revision 1 of this special report).
2. The necessary documentation revisions will be completed by July 31, 1992.