TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

September 13, 1982

TVA-SQN-TS-35
(Change No. 4)

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

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

In L. M. Mills' August 16, 1982 letter to H. R. Denton, we requested an amendment to the Sequoyah Nuclear Plant operating licenses DPR-77 and DPR-79 to change the technical specifications. The proposed technical specifications for modification of the surveillance requirements for testing of containment penetration protective fuses were provided in Enclosure 4 to the August 16, 1982 letter. Enclosed is supplemental information (revised justification) and revised proposed technical specifications as requested by Carl Stahle of your staff in a telephone conversation on August 27, 1982.

If you have any questions concerning this matter, please get in touch with J. E. Wills at FTS 858-2683.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

D S Kammer

D. S. Kammer
Nuclear Engineer

Sworn to and subscribed before me
this 13th day of Sept 1982
Bryant M. Lowery
Notary Public
My Commission Expires 4/8/86

B021

Enclosure
cc: See page 2

cc: U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

ENCLOSURE 4

SEQUOYAH NUCLEAR PLANT

TVA-SQN-TS-35

CHANGE NO. 4

MODIFICATION OF SURVEILLANCE REQUIREMENTS

FOR TESTING OF CONTAINMENT PROTECTIVE FUSES

JUSTIFICATION FOR MODIFICATION OF SURVEILLANCE REQUIREMENTS FOR TESTING OF CONTAINMENT PROTECTIVE FUSES

Sequoyah Nuclear Plant Technical Specification 4.8.3.1.a.3 requires that at least 10 percent of the fuses used for containment penetration conductor overcurrent protection be tested every 18 months. TVA believes that this requirement is costly and unnecessary because it does not enhance the safety or reliability of the plant. In fact, the testing may be detrimental to safety because excessive removal and insertion of fuses in the fuse holders may damage the contact points and the removal and replacement of in-line current limiters may compromise cable integrity. Both of these conditions can lead to an unwanted deenergization of equipment.

Gould Shawmut, a major fuse manufacturer, has provided TVA information to the effect that "(U)nder no condition can a current limiting fuse ever become less protective over life." It indicates that high temperatures, current surges, or unusual cycling conditions can reduce the life of a fuse "but this simply means it becomes more protective. Fuse resistance will only begin to change increase when unusual loading, cycling or indeed a short circuit occurs." In addition, it provided the following information on cable protecting fuses.

> Under no circumstances can cable protecting fuses be removed from cables without physically destroying them because of the crimped joint. Of all fuses, cable protector fuses are extra heavy so are (sic) the least susceptible to deterioration of all types. They are designed for cable isolation only under extreme overcurrent condition (sic). Utilities typically install them permanently with no intention of ever disturbing them. We have not seen a cable protecting fuse fail for any reason in nearly thirty years of sales.

TVA has 24 of these large cable protecting fuses installed for each unit on the reactor coolant pump motor feeds. In addition to the crimped joints, these fuses are wrapped with heat shrink insulation material which must be cut off in order to remove the fuse. The fuse and wrap are destroyed for each test.

Gould Shawmut uses resistance measurements for production quality control. However, these "resistances are not published because construction changes can occur at any time as designs change or materials are improved." The fuse resistance is a good measure of a fuse's rating, but it is not necessary to periodically remeasure the resistance because the fuse degradation mode does not decrease resistance.

In summary, TVA believes that a fuse inspection and maintenance program to verify that the proper size and type of fuse is installed, the fuse shows no signs of deterioration, and the fuse connections are tight and clean would ensure that the necessary level of containment penetration conductor overcurrent protection is maintained. The present technical specification requires testing that is unnecessary and costly because fuse resistance does not decrease under degrading conditions, it only will increase (and become more protective). In the case of large cable protecting fuses, the testing is destructive.

TVA met with NRC's Instrumentation and Controls System Branch on January 26, 1980 to discuss the electrical system technical specifications for Sequoyah unit 1. At that time, TVA stated its objections to the technical specification requirement to measure fuse resistances. However, the staff indicated that TVA did not have enough evidence to support the request. We trust that the experience of Gould Shawmut is sufficient evidence to support our claim that fuse resistance is unnecessary to ensure that containment penetrations are protected from conductor overcurrents.

TVA has considered the effect of oxidation at the point of contact between the fuse and fuse clip. We have determined that any oxidation at this point will not be detrimental to the overall safety function performed by the containment penetration protection fuses.

TVA plans to inspect for visible contact oxidation or evidence of damage or degradation as part of the periodic visual inspection. Any oxidation that may occur between inspections would raise the resistance at the point of contact. The increased contact resistance could cause local heating of the fuse. However, any heating that could, over an extended time period, lead to circuit failure would also lead to visible heat marks. The heat marks would be detected during the visual inspection. It must be noted that any heat related damage does not reduce the penetration protection provided by the fuse. Any oxidation or increase in temperature will make the circuit more restrictive to current flow due to increased resistance. The fuse will still provide the same level of protection because in a constant voltage circuit, current must decrease if resistance increases. This phenomena is explained by Ohm's law. If there is any increase in loading, the fuse will still blow at its rated current, thereby protecting the penetration. In the limiting case, if contact resistance increased to the point of keeping the current below the rated value of the fuse, the safety function would still be accomplished: The current through the penetration would still be limited. The worst case of oxidation of the contact point would be noted by an open circuit. All of the equipment is either in regular service during power operation or it is periodically energized as part of the equipment functional tests, at which time any operational problems would be noted.