TENNESSEE VALLEY AUTHORITY

5N 157B Lookout Place

April 17, 1986

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Denton:

In the Matter of the Application of	)	Docket Nos. 50-390
Tennessee Valley Authority	)	50-391

On March 20, 1986, S. A. White provided to you TVA's corporate position on compliance with 10 CFR 50 Appendix B requirements at our Watts Bar Nuclear Plant. Included with that response was an item-by-item discussion of 11 issues identified by TVA's Nuclear Safety Review Staff. One item discussed in that response requires some clarification to prevent a misunderstanding of one of TVA's programs.

Page four of the enclosure to that letter contains a discussion on distribution of cable pulling forces. The first sentence in that paragraph indicates pulling tension has been monitored on all pulls in conduits since 1978. We have found, during further review, that an inadvertent error was made in compiling this description. Between 1978 and 1983, only pull tension on mechanically assisted or tough cable pulls was required to be monitored. In 1983, our procedures were revised to require monitoring of cable pulls in conduit with certain noted exceptions.

I discussed this matter with Dick Wessman of your staff on April 16, 1986. A revised page is enclosed to replace page four in the March 20, 1986 submittal.

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We are evaluating this matter and we will notify you if any further actions are required. Please feel free to telephone me if you have any questions or need further information concerning this response.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

R Gridley

R. Gridley, Director
Nuclear Safety and Licensing

Sworn to and subscribed to before me
this 17th day of April 1986

Paulette H. White
Notary Public

My Commission Expires 8-24-88

Enclosure
cc (Enclosure):
Mr. James Taylor, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

U.S. Nuclear Regulatory Commission
Region II
Attention: Dr. J. Nelson Grace, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

The major cable manufacturers which had already done extensive testing, revised the SWP value upwards by a factor 2-3 times previous limits. The test results of the EPRI report No. EL-3333, "Maximum Safe Pulling Lengths for Solid Dietectric Insulated Cables," indicated realistic SWP limits for cables similiar to those at WBN to be 4-5 times higher than previous limits.

Review of the projected SWP, to which the cables were subjected, against realistic SWP limits, indicates none of the cables were installed exceeding SWP. However, maximum allowable pulling tension for cables contained in one conduit was calculated to have been exceeded. This condition is being evaluated to determine adequacy. A test program will be initiated to demonstrate the validity of the higher SWP limits for all the purchased cable, rather than rely on EPRI generic test results or results from other cable manufacturers.

Distribution of Cable Pulling Forces

General Construction Specification G-38 has always included the formula for calculating the maximum cable pulling force to ensure conductor damage did not occur during cable pulling. Since revision 2 of G-38, dated August 3, 1978, monitoring of the cable pulling force was required for mechanically assisted or tough cable pulls to assure that the maximum pulling force was not exceeded. Specification Revision Notice SRN-G-38-2, dated October 18, 1983, required monitoring of essentially all cable pulls in conduits with certain noted exceptions. Monitoring of cable pull tension is primarily done by use of a pulling link or dynamometer on the main pulling line. The link is selected such that its breaking strength is equal to or less than 80 percent of the sum of the conductor strength limit of each conductor in the pull.

NSRS's concern is that the tension of individual conductors is not monitored, only the total tension. Monitoring tension on the lead line assumes total tension divides proportionally between each cable.

TVA's practice of monitoring total tension rather than individual tension, does assure individual conductors strength limits are not exceeded, and is consistent with IEEE 690-1984, "Standards for the Design and Installation of Cable Systems for Class 1E Circuits In Nuclear Power Generating Stations." In fact, TVA's practice is more conservative, since we take 80 percent rather than 100 percent of individual conductor strength. Besides industry experience, acceptability of this practice was demonstrated in a recent cable pull in which the total pulling tension in a multi-cable pull was 3750 lbs. Several cables in the pull had a conductor-strength limit of 65 lbs. If the tension had not been distributed proportionally, the smaller cables would have snapped. These cables did not break or elongate.

Bending Radius

A cable's bending radius is restricted to prevent immediate or in some cases, long-term insulation failure. Two bending radius limits are specified by cable manufacturers: (1) training radius, (R_{Tmin}) when the cable is not under tension and will be left in its final position, and (2) pulling radius (R_{Pmin}), when the cable is under tension. Some manufacturers give the same value for R_{Pmin} as R_{Tmin}, others give a value of R_{Pmin} larger than R_{Tmin}. The use of this larger value of R_{Pmin}, by some manufacturers, is intended to address SWP at maximum conductor strength conditions. As of October 18, 1983, Specification Revision Notice, SRN-G-38-2, has required consideration of both R_{Tmin} and R_{Pmin}. Prior to SRN-G-38-2, G-38 required R_{Pmin} in conduits.