

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE
400 Chestnut Street

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October 3, 1984

WBRD-50-390/84-18

U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNIT 1 - CABLE INSULATION FAILS FIRE PROTECTION
TEST - WBRD-50-390/84-18 - SUPPLEMENTAL INFORMATION FOR UNIT 1

The subject deficiency was initially reported to NRC-OIE Inspector Bob Carroll on April 5, 1984 in accordance with 10 CFR 50.55(e) as NCR WBN EEB 8408. Our final report for unit 1 and first interim report for unit 2 was submitted on May 4, 1984. This supplemental information was requested by NRC Inspector W. H. Miller.

If you have any questions, please get in touch with R. H. Shell at FTS 858-2688.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills

L. M. Mills, Manager
Nuclear Licensing

Enclosure

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

Records Center (Enclosure)
Institute of Nuclear Power Operations
1100 Circle 75 Parkway, Suite 1500
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ENCLOSURE

WATTS BAR NUCLEAR PLANT UNIT 1
CABLE INSULATION FAILS FIRE PROTECTION TEST
NCR WBN EEB 8408
WBRD-50-390/84-18
10 CFR 50.55(e)
SUPPLEMENTAL INFORMATION FOR UNIT 1

This supplements TVA's letter dated May 4, 1984, to NRC on this NCR. The purpose of this report is to answer questions raised during the exit meeting on June 22, 1984, by NRC Inspector W. H. Miller on the use of PJJ cables which pass through a UL Classified 1 hour rated fire barrier, hereafter referred to as a fire barrier.

1. As previously stated in our May 4, 1984, report, all PJJ cables in conduits that pass through a fire barrier will be replaced with a qualified cable type. No PJJ cables are located in junction boxes which are being protected by a fire barrier. All PJJ cables in cable trays which pass through a fire barrier, that have been identified as required to achieve and maintain safe shutdown per 10 CFR 50, Appendix R, will be either replaced or rerouted out of the potential fire area.
2. PJJ cable types remaining in the cable trays that are not required for safe shutdown will not affect other cables in the tray. The following discussion justifies leaving the cables in the tray. Two possible events have been considered in the discussion, the first being that the cable may ignite, creating a fire within the barrier itself, and the second is that a normally energized nonsafety shutdown cable may, by means of insulation/jacket degradation, short to normally deenergized safe shutdown cable, thereby energizing the safe shutdown cable.

The vendor has submitted to TVA the following temperatures measured on the unexposed side of the fire barrier during testing at UL.

	<u>Average Temp.</u>	<u>High Temp.</u>
Minimum Fill Cable Tray	329°F	468°F
Maximum Fill Cable Tray	282°F	385°F

IEEE 634-1978, IEEE Standard Cable Penetration Fire Stop Qualification Tests states that the ignition temperatures of the insulation (Polyethylene) and jacket (Polyvinyl Chloride) materials of the PJJ cables is as follows:

<u>Material</u>	<u>Flash Ignition</u>	<u>Self-Ignition</u>
Polyethylene	645°F	660°F
Polyvinyl Chloride	735°F	850°F

The above table shows a 177°F difference between the hottest tray and the lowest flash ignition temperatures. Therefore, we conclude that the cables will not create a fire within the fire barrier.

TVA testing conducted by Central Laboratories Services documented that the PJJ cable in a conservatively filled cable tray had conductor-to-conductor failure at 346°F and in a lesser filled tray had a conductor-to-conductor failure at 440°F. Testing performed by 3-M on TVA supplied PJJ cables using a similar time versus temperature profile showed that the cable first failed conductor-to-conductor and then conductor-to-ground at 462°F. With regard to the failure point temperatures, the 3-M test confirms the validity of the TVA tests. However, more importantly the results of all three tests show the first failure was always conductor-to-conductor. The conductor-to-conductor failure in an actual fire condition would trip the overcurrent protection device for that circuit thereby deenergizing that circuit. In the highly unlikely event the cable did short to the cable tray before the conductor-to-conductor failure occurred, the cable tray is grounded (per the requirements of TVA General Construction Specification G-47, paragraph 2.2.2.3) which again would result in tripping the overcurrent protection device.

In view of this, it is concluded that a cable in a safe shutdown circuit will not be adversely affected during a fire as a result of PJJ cable being in the same tray.