

TENNESSEE VALLEY AUTHORITY

Chattanooga, Tennessee 37401
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SEP 07 1990

WBRD-50-390/89-02
WBRD-50-391/89-04

10 CFR 50.55(e)

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of the Application of)
Tennessee Valley Authority)

Docket Nos. 50-390
50-391

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - SUPPORT OF CLASS 1E CABLES
INSTALLED IN LONG VERTICAL CABLE TRAY RUNS - WBRD-50-390/89-02 AND
WBRD-50-391/89-04 FINAL REPORT

The subject deficiency was initially reported to NRC Region II Inspector Ken Barr on May 26, 1989, in accordance with 10 CFR 50.55(e) as Condition Adverse to Quality Reports (CAQRs) WBP 880564 (Unit 1) and WBP 880575 (Unit 2). Additionally, this same issue was identified by NRC in Inspection Report 50-390/88-05 and 50-391/88-05 as Unresolved Item (URI) 88-05-03 (December 2, 1988) and by the Vertical Slice Review Team as Discrepancy Report (DR)-07 on September 7, 1988.

Enclosure 1 provides TVA's final report regarding the installation of cables in vertical trays without adequate support. Enclosure 2 provides the list of commitments associated with the implementation of the corrective actions described in this report.

In addition, TVA requests closure of URI 390, 391/88-05-03 in conjunction with this item since these items address the same issue. Region II staff was notified on September 5, 1990, of the delay in the submittal of the final report. If there are any questions, please telephone P. L. Pace at (615) 365-1824.

Very truly yours,

TENNESSEE VALLEY AUTHORITY



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Enclosures
cc: See page 2

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ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2
SUPPORT OF CLASS 1E CABLE INSTALLED IN LONG VERTICAL CABLE TRAY RUNS
WBRD-50-390/89-02 AND WBRD 50-391/89-04
CAQRs WBP 880564 (UNIT 1) AND WBP 880575 (UNIT 2)
10 CFR 50.55(e)
FINAL REPORT

DESCRIPTION OF DEFICIENCY

The subject condition adverse to quality reports (CAQRs) identify a deficiency at WBN with cables which have been installed in vertical trays without adequate support. This is contrary to the requirements of TVA General Construction Specification G-38 which states that cable support spacing shall be in accordance with the National Electrical Code (NEC) Article 300-19 (1987). The cables have been supported with tie-wraps in accordance with the requirements of G-38 at the time of installation. However, TVA did not have a documented basis to verify that cable ties provided adequate support. This deficiency was identified by NRC in Unresolved Item (URI) 390, 391/88-05-03 and by TVA in CAQRs WBP 880564 and WBP 880575.

SAFETY IMPLICATIONS

Insufficient support of cables in vertical trays could cause excessive tension at termination points and could cause cables to pull away from their termination points. Additionally, conductor creep could result from this deficiency. Any of these potential effects could cause a failure of a safety-related cable to perform its safety function. Therefore, this condition may have adversely affected the safe operation of the plant had it remained uncorrected.

CORRECTIVE ACTION

Drawing reviews and calculations were performed to define those families of trays^{1,2} containing safety-related cables wherein adequate support may not have been provided to meet the requirements of NEC³. Walkdowns⁴ are being employed to obtain as-built configurations. Where the length of the vertical drop exceeds 25 percent of the support spacing stipulated in the NEC and a discrete support is not present, TVA is confirming that a method of equal effectiveness exists, as permitted by the code.

1. Calculation WBPEVAR8907010, "Selection of Class 1E Vertical Trays for the Vertical Support in Vertical Tray Walkdown."
2. Calculation WBPEVAR9005001, "Analysis of Effect of Vertical Cable Runs on Acceptability of Installed Cables."
3. Article 300-19, National Electric Code (1987).
4. Walkdown TI-94.04, "Cable Support in Vertical Tray Walkdown."

TVA's calculations documented the acceptability of the WBN as-installed cables in vertical trays with regard to NEC 300-19 support requirements. TVA's analysis includes consideration for the degrading mechanisms that could result from the vertical drop and acknowledges the inherent support provided by the raceway system (sweeps, horizontal sections above a drop, etc.). The results of this analysis indicate that the horizontal lengths of cables above the vertical runs adequately support the cable weight in the vertical drop assuming the presence of ties or Vimasco. In addition, the analysis indicated that the cables will not shift or creep due to the cable weight, including the Vimasco. Therefore, the damage mechanism due to the use of tie-wraps is unlikely because the cables are restrained by the horizontal section above the vertical run (i.e., no movement).

Although IEEE-690⁵ recommends securing the cable to the tray rungs every 2-5 feet to provide support, no credit is taken for tie-wraps to support the cable weight due to the uncertainty of tie spacing and lack of environmental qualification documentation. However, since the rigidity of the cable mass provided by the presence of Vimasco or tie-wraps has contributed to the selection of an appropriate coefficient of friction, TVA will confirm that either Vimasco or tie-wraps are installed in the horizontal run above tray segments violating the NEC 300-19 vertical drop requirements.

General Construction Specification G-38 was revised to specify the use of ties where required to maintain the rigidity of the cable mass and to maintain the validity of the analysis performed.

Calculations, walkdowns, evaluations, and rework will be completed for Unit 2 as required to address this issue before Unit 2 fuel load.

5. IEEE 690-1984, "Standard for the Design and Installation of Cable Systems for Class 1E Circuits in Nuclear Power Generating Stations."

ENCLOSURE 2

LIST OF COMMITMENTS

Commitments made in this submittal:

- ° For safety-related cable trays, confirm the presence of ties or Vimasco on all cables in the vertical and horizontal segments of concern.
- ° Revise calculation to document results of cable tray inspections and support of cables entering tray.
- ° Complete the calculation, walkdowns, evaluations, and rework for Unit 2 before Unit 2 fuel load.