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AUG 1 9 1993

CDR-50-390/93-02
CDR-50-391/93-02

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) - LOOSE FLEXIBLE CONDUIT FITTINGS - CDR-50-390/93-02 AND CDR-50-391/93-02 - FINAL REPORT

The subject deficiency was initially reported to the NRC Operations Center on July 22, 1993, in accordance with 10 CFR 50.55(e)(3) as Significant Corrective Action Report (SCAR) WBSCA930071. Enclosure 1 to this letter contains TVA's final report on this subject. Enclosure 2 provides a list of commitments made in this submittal.

If you have any questions, please telephone P. L. Pace at (615) 365-1824.

Very truly yours,

W. J. Museler

William J. Museler

Enclosures
cc: See page 2

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cc (Enclosures):
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ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) - UNITS 1 AND 2
LOOSE FLEXIBLE CONDUIT FITTINGS
CDR 50-390/93-02 AND CDR 50-391/93-02
FINAL REPORT

DESCRIPTION OF DEFICIENCY

During a Quality Assurance (QA) assessment of the completed portions of the Electrical Issues Corrective Action Program (CAP) Plan, loose flexible conduit fittings have been identified on various conduits. This condition is contrary to General Construction Specification G-40, "Installation, Modification and Maintenance of Electrical Conduit, Cable Trays, Boxes, Containment Electrical Penetrations, Electric Conductor Seal Assemblies, Lighting, and Miscellaneous Systems," which requires flexible conduit fittings to be wrench tight.

Flexible conduit is installed as an interface between rigid conduit and equipment where seismic and thermal expansion must be considered. The location of the loose flexible conduit fittings can be either at the equipment and/or the rigid conduit connections.

This loose fitting condition is also contrary to the previously established corrective actions of Significant Corrective Action Report (SCAR) SCR6463SSCA and the Electrical Issues CAP which required field inspection and correction of identified loose fittings.

SAFETY IMPLICATIONS

Loose flexible conduit fittings which remain uncorrected increase the possibility of disengagement if a constant vibration source is present. If left uncorrected this vibration (pumps, motors, fans, valves attached to pipes, etc.), could cancel the resistance for movement created by thread engagement, creating a "walk-off" effect leading to disengagement of the conduit. Tightening of flexible conduit fittings are individually performed, making the tightness of each fittings unique. Upon fitting disengagement, the cable would be vulnerable to damage mechanisms such as construction activities, seismic event, jet impingement and weight of flexible conduit causing the cable to pull loose from terminations or force the cable to bend over a sharp edge. This scenario is partially negated by cable construction (cable jacket, conductor tensile strength and insulation strength) being designed to withstand forces encountered during pulling activities and conduit installations with long vertical drops. The consequences on plant design functions if cable damage were to occur is that the associated component may not function properly, preventing the system from performing its design function. Therefore, had this condition remained uncorrected, plant safety could have been adversely affected.

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) - UNITS 1 AND 2
LOOSE FLEXIBLE CONDUIT FITTINGS
CDR 50-390/93-02 AND CDR 50-391/93-02
FINAL REPORT

CAUSE OF THE DEFICIENCY

Previous corrective action established by Significant Corrective Action Report (SCAR) SCR6463SSCA and the Electrical Issues CAP required walkdowns to inspect and correct as required Class 1E conduits with loose fittings. While the Class 1E conduit walkdown seemed to be adequately performed in accordance with the Electrical Issues CAP and SCAR SCR6463SSCA, the intent of the corrective action plans for these two documents was to provide a plan to correct the "loose flexible conduit fitting" issue. Implementation of this plan was not completely adequate which is shown by the results of the QA assessment.

Evaluation of the work request (WR)/work order (WO) criteria utilized for the Class 1E conduit walkdown revealed a somewhat vague inspection attribute for loose flexible conduit fittings. However, discussions/interviews with involved field personnel indicated that General Construction Specification G-40 requirements were met during this inspection process.

Additional research on the identified loose flexible fittings revealed that subsequent work was performed by the modifications organization after the walkdown inspections were performed and prior to system turnover from the modifications organization to the start-up and test organization. The work performed was associated with other issues such as cable splice and termination inspection/rework and the cable damage issue. The flexible conduit walkdown is often performed prior to completion of the other issues which could inadvertently loosen fittings during this work. After a system is transferred from modifications to start-up and test, additional work orders owned by start-up and test can be worked and testing performed thereby providing an opportunity for the flexible fittings to become loose. In addition, the plant maintenance section has been performing periodical work on various devices which would also provides an opportunity for the flexible fittings to become loose.

In summary, the cause of this deficiency is that physical work on other modifications or plant work documents could have inadvertently loosened fittings prior or after initial system turnover.

CORRECTIVE ACTIONS

In order to correct the six loose flexible conduit fittings specifically identified by SCAR WBSCA930071, TVA will implement work documents to tighten the six fittings.

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) - UNITS 1 AND 2
LOOSE FLEXIBLE CONDUIT FITTINGS
CDR 50-390/93-02 AND CDR 50-391/93-02
FINAL REPORT

TVA will take the following actions to prevent recurrence of this condition:

SCAR WBSCA930071 will be discussed with appropriate craft workers, WR/WO planners and field engineers to emphasize the identified deficiencies and corrective actions.

The Class 1E conduit walkdown criteria established as corrective action for the Electrical Issues CAP and SCAR SCR6463SSCA will be strengthened for loose fittings to include specific criteria from the requirements of G-40.

A review of the instructions affecting flexible conduit detachment and reinstallation will be performed. Enhancements will be made as required to properly convey the design requirements for flexible conduit fittings.

To address the extent of condition, TVA will enhance the damaged, loose, or missing hardware walkdown to provide a "hands on" inspection of flexible conduit fittings during the area turnover walkdowns. Since the area turnover walkdowns have not yet begun, the conduit fittings on previously transferred systems will be examined.

The strengthened criteria of the Class 1E walkdown discussed above coupled with the area turnover walkdown provides assurance of proper correction of the implementation problems identified by the QA assessment and ultimately the loose flexible conduit fitting issue.

These corrective actions will be completed by Unit 1 fuel load.

ENCLOSURE 2

LIST OF COMMITMENTS
CDR 50-390/93-02 AND CDR 50-391/93-02
FINAL REPORT

1. In order to correct the six loose flexible conduit fittings specifically identified by SCAR WBSCA930071, TVA will implement work documents to tighten the six fittings.

2. SCAR WBSCA930071 will be discussed with appropriate craft workers, WR/WO planners and field engineers to emphasize the identified deficiencies and corrective actions.

3. The Class 1E conduit walkdown criteria established as corrective action for the Electrical Issues CAP and SCAR SCR6463SSCA will be strengthened for loose fittings to include specific criteria from the requirements of G-40.

4. A review of the instructions affecting flexible conduit detachment and reinstallation will be performed. Enhancements will be made as required to properly convey the design requirements for flexible conduit fittings.

5. To address the extent of condition, TVA will enhance the damaged, loose, or missing hardware walkdown to provide a "hands on" inspection of flexible conduit fittings during the area turnover walkdowns. Since the area turnover walkdowns have not yet begun, the conduit fittings on previously transferred systems will be examined.

These corrective actions will be completed by Unit 1 fuel load.