TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401

5N 157B Lookout Place

SEP 21 1988

WBRD-50-390/87-08
WBRD-50-391/87-08

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) Docket Nos. 50-390
Tennessee Valley Authority) 50-391

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - IMPROPER FABRICATION, INSPECTION, AND DOCUMENTATION OF WALL-MOUNTED INSTRUMENT PANELS - WBRD-390-87-08 AND WBRD-50-391/87-08 - REVISED FINAL REPORT

The subject deficiency was initially reported to NRC Region II Inspector Ken Barr on February 19, 1987, in accordance with 10 CFR 50.55(e) as Significant Condition Reports (SCRs) WBN 6738-S and 6713-S for units 1 and 2, respectively. Subsequent to the initial notification, SCR WBN 6738-S was replaced by SCR W-559-P-S. Interim reports were submitted on March 23 and July 16, 1987, and a final report was issued on March 16, 1988. Enclosed are our revised final report and a list of new commitments.

If there are any questions, please telephone G. R. Ashley at (615) 365-8527.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

R. Gridley, Manager
Nuclear Licensing and
Regulatory Affairs

Enclosures
cc: See page 2

IE27
1/1

U.S. Nuclear Regulatory Commission

SEP 21 1988

cc (Enclosures):
Ms. S. C. Black, Assistant Director
for Projects
TVA Projects Division
U.S. Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852

Mr. F. R. McCoy, Assistant Director
for Inspection Programs
TVA Projects Division
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Record Center
Institute of Nuclear Power Operations
1100 Circle 75 Parkway, Suite 1500
Atlanta, Georgia 30339

U.S. Nuclear Regulatory Commission
Watts Bar Resident Inspector
P.O. Box 700
Spring City, Tennessee 37381

ENCLOSURE 1

IMPROPER FABRICATION, INSPECTION, AND DOCUMENTATION
OF WALL-MOUNTED INSTRUMENT PANELS
WBRD-50-390/87-08 AND WBRD-50-391/87-08
SCR W-559-P-S AND WBN 6713-S
10 CFR 50.55(e)
REVISED FINAL REPORT

DESCRIPTION OF DEFICIENCY

The seismic adequacy of approximately 176 site-fabricated local instrument panels (122 on unit 1 and 54 on unit 2) in several safety-related systems at Watts Bar Nuclear Plant (WBN) has not been verified because of a lack of assurance of the fabricated configuration. Weld joints were shown on the design drawings to require full-penetration, single-bevel welds. However, these welds were found to generically lack complete penetration and assigned joint configuration. In addition, TVA did not perform adequate structural (configuration and material verification) inspections of the instrument panels which, in conjunction with the identified weld deficiency, renders the overall adequacy of the panels questionable.

The root cause of this deficiency cannot be clearly isolated because most of these panels were fabricated before 1981, and documentation required for this fabrication is sparse. However, TVA has identified factors which may have contributed to the problem. One factor is inattention to detail or misunderstanding of the requirements for the specified weld by craft and inspection personnel. Additionally, the welds specified for these panels are different from the partial penetration butt welds typically specified for similar components.

TVA considers this deficiency a lack of control in the area of welding and inspection for the fabrication of wall-mounted instrument panels. Since the Department of Energy Weld Evaluation Project (WEP) did not identify similar general failures to adhere to weld joint design requirements, TVA considers the deficiency limited in scope to these panels. Therefore, it does not represent a significant breakdown in the quality assurance (QA) program.

SAFETY IMPLICATIONS

Unit 1: Evaluation which is reported in the corrective action has concluded that there are no adverse safety implications as a result of the subject deficiency.
Unit 2: Because of the identified deficiencies and lack of documentation, the seismic qualification of these panels is indeterminate. If the panels fail to withstand a safe shutdown earthquake, random instrument failures could result, including misleading indication and protection channel failures, as well as possible damage to adjacent safety-related components. This could adversely affect the safety of operation of the plant. The replacement of unit 2 panels began before the safety significance evaluation was performed. However, based upon the factor of safety determined by the unit 1 evaluation and because of the similarity in the design and installation of the unit 2 panels, it is considered unlikely that the unit 2 panels would have failed.

CORRECTIVE ACTION

TVA considers this problem to be limited to the wall-mounted instrument panels. Although no root cause was clearly identified, TVA considers that the WEP would have identified any related deficiencies. The panels were designed for shop fabrication, and consideration was given to the possibility that there may have been a problem with the shop fabrication. However, review of available records indicates that while many of the panels were fabricated in the shop, many were fabricated in the field. Some other components were identified which were fabricated in the shop in the same general timeframe. These were inspected and found not to have problems outside the scope of the WEP findings. This supports the conclusion that there was not a generic problem with the shop-fabricated components and that similar generic deficiencies were not overlooked by WEP.

For the wall-mounted instrument panels, the following actions will prevent recurrence of this deficiency:

- Engineering requirement ER-WBN-EEB-001, revision 2, was issued to clarify and consolidate in one document the engineering and design requirements necessary for installation, modification, maintenance, and inspection of instrument systems. Affected site procedures have been revised to incorporate these requirements and enhance the program for fabrication, inspection, and documentation of the panels.

- Training has been provided to affected craft personnel in procedure changes and adherence to drawing requirements, and to quality control (QC) inspectors to encompass the procedure changes and weld symbol interpretation.

- Management overview of QC inspectors has been included in site procedures to provide early detection of potential problems in the future.

Additional measures which will prevent recurrence of this problem were implemented independently of this deficiency subsequent to the fabrication of these panels. These include procedural requirements for foremen to verify fitup for all welds before beginning welding and random surveillance inspections by welding QC inspectors for weld fitups.

The safety significance of the deficiencies for the panels required for unit 1 operation was evaluated by TVA. The evaluation involved a visual, qualitative grading of the highest loaded welds on the wall-mounted panels identified by SCR W-559-P-S. This grading identified panels 0-L-310 and 2-L-290 as having the least amount of effective weld at the critical joints. These two panels were tested at TVA's Singleton Materials Engineering Laboratory with three loading cycles: a safety significant load; a long-term qualification load; and, finally, an ultimate load for the panels was found by fragility (destructive) testing. Each panel satisfactorily passed the two qualification load levels and a factor of safety of approximately 10 was demonstrated for the ultimate structural capability of the panel above the long-term qualification load. Therefore, it was concluded that the unit 1 panels are acceptable for use-as-is without rework. The two panels destructively tested will be replaced in accordance with applicable site procedures before fuel load of unit 1.

Unit 2 panels have been replaced with panels fabricated in accordance with applicable site procedures or reworked to ensure full penetration welds and proper configuration and material. Inspections will be performed and documentation generated in accordance with appropriate site procedures to ensure that structural configuration, including welding, for the unit 2 wall-mounted instrument panels is in accordance with design drawings. This work will be completed before fuel load of unit 2.

ENCLOSURE 2

LIST OF COMMITMENTS

The two panels destructively tested will be replaced with panels fabricated in accordance with engineering drawings for the wall-mounted panels (47A061-11) by fuel load of unit 1.