



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
101 MARIETTA ST., N.W., SUITE 3100  
ATLANTA, GEORGIA 30303

Report Nos. 50-390/79-20 and 50-391/79-16

Licensee: Tennessee Valley Authority  
500A Chestnut Street Tower II  
Chattanooga, Tennessee 37401

Facility Name: Watts Bar Nuclear Plant, Units 1 and 2

Docket Nos. 50-390 and 50-391

License Nos. CPPR-91 and CPPR-92

Inspection at Watts Bar Dam near Spring City, Tennessee

Inspectors: *D. K. Walters* 5/29/79  
D. K. Walters Date Signed

*R. J. Hardwick* 5/29/79  
R. J. Hardwick Date Signed

Approved by: *J. C. Bryant* 5/29/79  
J. C. Bryant, Section Chief, RCES Branch Date Signed

SUMMARY

Inspection on April 17-20, 1979

Areas Inspected

This routine, unannounced inspection involved 58 inspector-hours onsite in the areas of preservation, cleanliness and internal wire terminations of 6900 volt safety related shutdown boards; safety related cable tray installation and cable separation for auxiliary building elevations 713, 729, 737 and 772; installation and quality records for safety-related power cables.

Results

Of the three areas inspected, no apparent items of noncompliance or deviation were identified in one area; two apparent items of noncompliance were found in two areas. (Infraction 390/79-20-01 and 391/79-16-01: Failure to route cables per pull slip requirements; Infraction 390/79-20-02 and 391/79-16-02: Failure to provide procedures for cable tray modification or removals.); One apparent deviation was found in one area (Deviation 390/79-20-04, Failure to achieve full compliance for infraction 390/79-07-01 by committed date).

Q 7910020282

## DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*H. C. Richardson, Construction Engineer
- \*S. Johnson, Assistant Construction Engineer
- \*J. G. Shields, Assistant Construction Engineer
- \*R. L. Heatherly, Supervisor, QC & R Unit
- \*A. W. Rogers, Site QA Supervisor
- \*E. J. Austin, Assistant Supervisor, Electrical Engineering Unit (EEU)
- \*R. D. Anderson, Electrical Engineer, EEU
- \*G. W. Robinson, Electrical Engineer, EEU
- J. E. Hoffert, Electrical Engineer, EEU
- T. R. Raley, Electrical Engineering Aid, EEU
- J. B. Eastham, Electrical Engineering Aid, EEU
- J. Vineyard, Electrical Engineer, EEU

Other licensee employees contacted included six construction craftsmen.

#### NRC Resident Inspector

\*B. J. Cochran

\*Attended exit interview.

### 2. Exit Interview

The inspection scope and findings were summarized on April 20, 1979 with those persons indicated in Paragraph 1 above. The two infractions, one unresolved item and deviation listed below were discussed in detail.

- a. Infraction 390/79-20-01 and 391/79-16-01: Failure to route cables per pull slip requirements.
- b. Infraction 390/79-20-02 and 391/79-16-02: Failure to provide procedures for cable tray modifications or removals.
- c. Unresolved item 390/79-20-03 and 391/79-16-03: Acceptance criteria for 6900 volt shutdown board factory installed wiring.
- d. Deviation 390/79-20-04: Failure to achieve full compliance for infraction 390/79-07-01 by committed date.

The licensee acknowledged the findings.

3. Licensee Action on Previous Inspection Findings

(Open) Infraction 390/79-07-01, Failure to follow procedure for installation of electrical cables. Licensee corrective actions identified by TVA letter to Region II dated April 6, 1979 consist of the following:

- a. Procedure WBNP-QCP-3.5, "Installation, Inspection and Testing of Insulated Control Signal and Power Cables", has been revised to detail actions to be taken in cases where cable has not been installed in raceways as detailed on the pull slip. Revision 8 to WBNP-QCP-3.5 provides more detailed instructions for the following:
- (1) Clarifies and stresses the necessity that routing be followed as specified by the pull slip to both craft and inspection employees.
  - (2) Strengthens inspection procedures and provides methods to correct or approve deviations or correct instances where the pull slip did not correspond to conduit, cable tray, or equipment installation drawings.

The procedure is now in the revision cycle and is being reviewed for approval and issue.

- b. Nonconformance report number 1445R was written for cables 1-4PL-70-4733-A, 1-5PP-212-759-A and 1-4PL-213-4935-A requesting design approval. Cables identified in this nonconformance will be corrected.
- c. All responsible engineers have been cautioned to review the cable pull slips for accuracy according to conduit installation drawings and cable tray node diagrams before issuing the pull slips to craft employees.
- d. Inspectors have been cautioned to physically trace the cable routing specified by the pull slip to verify that conduit enters the cable tray system at the specified node points. Deviations or problems should be corrected before the cable is pulled by following the field change request or nonconformance procedures.
- e. After the approval and issue of revision 8 to WBNP-QCP-3.5, retraining shall be given to all engineering/inspectors and craft foremen involved in the installation and inspection of electrical cable to ensure they are aware of the procedural requirements.
- f. Full compliance will be achieved by April 16, 1979. In addition to the corrective actions specified in the letter to Region II, the licensee selected a sample of the installed safety-related cables and verified that the routing was in accordance with the cable pull slips.

As of April 20, 1979, the licensee had not attained full compliance, and the following was determined.

- a. Review and approval of revision 8 to WBNP-QCP-3.5 had not been completed, and the revision had not been issued.
- b. Since revision 8 to WBNP-QCP-3.5 had not been issued, retraining had not been given to all engineering/inspectors and craft foremen involved in the installation and inspection of electrical cables.
- c. During this inspection two safety-related power cables which were not routed in raceways as detailed on the cable pull slips were discovered (see paragraph 6 for details).

This item will remain open pending licensee achievement of full compliance.

The failure to achieve full compliance by April 16, 1979 as reported in the licensee's letter to Region II appears to be a deviation and is identified as Deviation 390/79-20-04, Failure to achieve full compliance for infraction 390/79-07-01 by committed date.

#### 4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve noncompliance or deviations. New unresolved items identified during this inspection are discussed in paragraph 5.

#### 5. Independent Inspection Effort (Unit 1 and 2)

The inspectors observed the internal preservation, cleanliness and factory wire terminations for safety related 6900 volt shutdown boards 1A-A (panel 14) and 2A-A (panels 4 and 15). Inspection of the factory wire terminations resulted in the observation of four wire terminations which had from three to five broken strands in the conductor at the termination. Two of the terminations were on terminals 5 and 9 of terminal board TBA in panel 4 of 6900 volt shutdown board 2A-A, and two were on terminals 10 and 11 of terminal board TBA in panel 14 of 6900 volt shutdown board 1A-A.

The inspectors requested that the licensee provide the acceptance criteria for the internal factory wire terminations. Although the licensee was unable to provide the requested information at this time, the following additional information was provided.

- a. 6900 Volt shutdown boards, 1A-A, 1B-B, 2A-A and 2B-B had been nonconformed upon initial receipt on-site from the vendor. The deficiencies identified included internal wiring deficiencies.
- b. Licensee site personnel had initiated Condition Adverse to Quality Report (CAQR) number E-2, with subsequent Rev. 1, which identified a number of deficiencies including internal wiring deficiencies. The CAQR "Recommended Corrective Action" consisted of the following.

- (1) TVA personnel inspect all items for compliance with contract specifications and determine the adequacy of control wiring installation on class I equipment.
- (2) Correct violations to the contract specifications according to a vendor supplied procedure approved by the licensee.

The CAQR "Reply/Resolution" approved the "Recommended Corrective Action" and designated that TVA Inspection and Test (I&T) personnel assume the lead in the inspection and that construction personnel provide support.

- c. Licensee site personnel had issued a corrective action report (CAR) which identified the corrective action and stated that the vendor had assisted TVA field personnel to correct the subject nonconformance and bring the equipment up to contract specifications.

The licensee stated that since the vendor did not acknowledge any contract deficiencies, the procedure to correct contract deficiencies per CAQR E-2, Rev. 1, was not provided by the vendor. The fact that the vendor had not provided a corrective action procedure was not documented in the CAR for CAQR E-2, Rev. 1.

Since the licensee was unable to provide the acceptance criteria for internal factory wire terminations, this item is unresolved and is identified as unresolved item 390/79-20-03 and 391/79-16-03, "Acceptance criteria for 6900 volt shutdown board factory installed wiring".

Installed safety-related cables and trays on elevations 713, 729, 737 and 772 of the auxiliary building were visually inspected for separation and identification in accordance with Watts Bar Nuclear Plant (WBNP) Quality Control Procedure (QCP) 3.4, revision 7, "Installation, Inspection, and Documentation of Cable Trays Systems". The cables were visually inspected for separation between safety-related trains and channels per WBNP-QCP-3.5, Rev. 7, "Installation, Inspection, and Testing of Insulated Control, Signal, and Power Cables".

Within the areas inspected, there were no items of noncompliance or deviations identified.

6. Electrical (Cables and Terminations I) Observation of Work and Work Activities (Units 1 and 2)

The inspectors selected the following safety-related 6900 volt power cables for examination:

<u>Cable Number</u>	<u>Use</u>
1-5PP-74-575-A	Power feed to Residual Heat Removal (RHR) Pump Number 1A-A

2-5PP-63-600-A                      Power feed to Safety Injection Pump Number 2A-A  
2-5PP-212-759-A                    Power feed to 480V Shutdown Board Number 2A2-A

Work and work records were examined in the areas of storage, handling, identification, use of specified material and installation. Completed "Pull" and "Termination" slips were reviewed to ensure cable installation instructions and inspections required by WBNP-QCP-3.5 were specified and verified as being accomplished in the following areas.

- a. Maximum allowable pull tension
- b. Rope pull device size
- c. Special pull instructions
- d. Installed cable length
- e. Termination data
- f. Crimp and torque tool numbers
- g. Cable routing

Both craft and electrical engineering unit (EEU) personnel were interviewed concerning cable pulling and termination procedures.

Cable size, type, physical protection, independence, separation, routing, identification and termination per connection drawings were examined at the 6900 volt shutdown panel cable end. It was observed that cable numbers 1-5PP-74-575-A and 2-5PP-63-600-A were not routed in the cable trays specified by their pull slips. Cable number 1-5PP-74-575-A was routed through cable tray section 5A2192 and not section 5A2189 as required by its pull slip. Also, cable number 2-5PP-63-600-A was routed through cable tray section 5A2208 and not section 5A2224 as required by its pull slip. WBNP QCP-3.5 requires that electrical cables be installed in raceways as detailed on pull slips and as designated in this procedure. Cable numbers 1-5PP-74-575-A and 2-5PP-63-600A had been inspected and accepted by the EEU engineer as required by WBNP-QCP-3.5.

As discussed in paragraph 3, infraction 390/79-07-01 previously identified cables which had not been routed as specified by the cable pull slip. The incorrect routing of cable numbers 1-5PP-74-575-A and 2-5PP-63-600A appears to be a noncompliance and is identified as Infraction 390/79-20-01 and 391/79-16-01, Failure to route cables per pull slip requirements.

Cable tray grounding, bonding, supports, identifications, and loading appeared to be adequate. It was observed that cable tray section 3B2266 had been removed by unbolting and temporarily relocated in an adjacent section of the cable tray. Also, one end of cable tray section 5A2224 had been unbolting and dropped down. The Equipment Monitoring Program (EMP) computer printout indicated that the installation of these cable tray sections had been completed. The QC installation inspection for both cable tray sections had been completed and documented on the "Cable Tray Segment Installation" card and filed in the document (DOC) file as required by WBNP-QCP-3.4. Although Electrical Engineering Unit personnel were unaware

of the actual field conditions, it was determined that these cable tray sections had been previously installed and inspected but, due to construction activity in the area, they were temporarily disconnected.

The EMP computer printout and the QC inspection cards had not been updated to reflect the actual field conditions. A review of WBNP-QCP-3.4 revealed that no guidelines or instructions have been provided for instances where cable tray systems require modification or removal after initial installation. This failure to provide procedures appears to be a noncompliance and is identified as Infraction 390/79-20-02 and 391/79-16-02, Failure to provide procedures for cable tray modifications or removal.