



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA ST., N.W.
ATLANTA, GEORGIA 30323

Report Nos.: 50-390/88-05 and 50-391/88-05

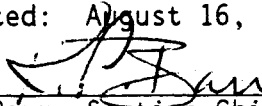
Licensee: Tennessee Valley Authority
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1101 Market Street
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Docket Nos.: 50-390 and 50-391 License Nos.: CPPR-91 and CPPR-92

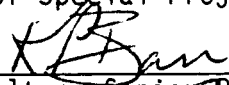
Facility Name: Watts Bar 1 and 2

Inspection Conducted: August 16, 1988 - September 20, 1988

Inspectors:

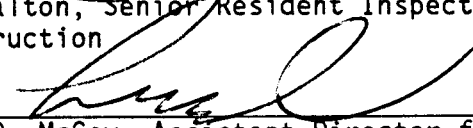

K. P. Barr, Section Chief
TVA Projects Section 3
TVA Projects Division
Office of Special Projects

11/18/88
Date Signed


G. A. Walton, Senior Resident Inspector
Construction

11/18/88
Date Signed

Approved by:


Frank R. McCoy, Assistant Director for
TVA Inspection Programs
TVA Projects Division
Office of Special Projects

12/2/88
Date Signed

SUMMARY

Scope: This routine resident inspection was conducted in the areas of fire prevention and fire protection; testing of pipe supports and restraint systems; review of Quality Assurance manual; safety related piping; welding; electrical procedures; review of Vertical Slice programs; and actions on previous inspection findings.

Results: No violations were identified during this inspection. Three unresolved items* were identified: Maintenance Request forms were being used to identify and correct hardware deficiencies but no apparent trending of these licensee-identified deficiencies was occurring, Paragraph 4; Valves and adjacent welds were removed from ASME pressure boundary systems without proper documentation changes to the N-5 program, Paragraph 5; and General Construction Specification G-38 inappropriately allows the use of tie wraps to provide support of 1E Cable in vertical cable trays, Paragraph 7.

*URI's are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *R. Pedde, Site Director
- *B. Willis, Acting Plant Manager
- *G. Ashley, Compliance Supervisor
 - G. Atwood, Division of Nuclear Engineering
- *H. Bounds, Division of Nuclear Engineering
- *M. Brickey, Division of Nuclear Engineering
 - J. Coan, Assistant Project Engineer
- **J. Cox, Watts Bar Program Team (Licensing)
 - G. Curtis, Assistant Project Engineer
- *T. Dean, Compliance/Licensing
- **F. Denny, Division of Nuclear Quality Assurance
- *K. Hasting, Assistant Construction Engineer
- **W. Horne, Watts Bar Program Team (Construction)
 - T. Horst, Nuclear Site Representative
- *H. Johnson, Acting Site Quality Manager
- *K. Jones, Technical Support Superintendent
- *D. Leckie, Engineering Specialist
- **R. Lewis, Watts Bar Program Team (Quality Assurance)
- **P. Mandava, Watts Bar Program Team (Engineering)
 - P. Metcalf, Division of Nuclear Engineering
- *D. McConrill, Maintenance Planning Supervisor
 - J. McDonald, Site Licensing Manager
- *C. Nelson, Maintenance Superintendent
 - H. Simpson, Manager of Special Projects
 - S. Stagnolia, Modifications Manager
 - D. Stewart, Assistant Site Director
 - J. Thompson, Construction Manager
- *R. Tolley, Project Manager's Office

Contract Personnel

- **P. Agrawal, Watts Bar Program Team Staff
- **J. Beard, Watts Bar Program Team (Electrical)
 - E. Fuller, Watts Bar Program Team Chairman
 - R. Heider, Vertical Slice Review Team Project Manager S&L
 - R. Humphreys, Vertical Slice Review Team, Construction and Records Verification Manager, S&L
 - H. Taylor, Vertical Slice Review Team, IRC Chairman

Other licensee employees contacted included engineers, technicians, nuclear power supervisors, and construction supervisors.

*Attended exit interview on September 20, 1988

**Attended exit interview for VSR on September 23, 1988

Vertical Slice Review progress was monitored and independence of the Vertical Slice Review Team members was found to be acceptable with restrictions established based on previous Watts Bar involvement. The Construction Verification inspections performed by the on site team were found to be acceptable to identify significant variations between actual installation and design drawings. Vertical Slice Review is about 50% complete, Paragraph 9.

Acronyms and initialisms used throughout this report are listed in the last paragraph.

2. Fire Prevention and Fire Protection - Unit 2 (42051)

During plant tours, the inspectors conducted observations of fire prevention and protection activities in areas containing combustible materials where ignition of these materials could damage safety-related structures, systems or components. The observations included verification that applicable requirements of AI 9.9, Rev. 15, "Torch Cutting, Welding, and Open Flame Work Permit", Security Procedure 2, Rev. 27, "Fire Protection Plan", AI 1.8, Rev. 13, "Plant Housekeeping" and CEP 1.36, Rev. 3, "Housekeeping" were being implemented with regards to fire prevention and protection.

Within this area no violations or deviations were identified.

3. Testing of Pipe Supports and Restraint Systems - Unit 1 (70370C)

The inspector toured areas of the Unit 1 auxiliary building and reactor building. Numerous snubbers and restraints were observed. Visual examinations were conducted to check for deterioration and physical damage of mechanical snubbers. Visual examinations were also conducted to check for damage of base support plates, fasteners, locknuts, brackets, and clamps associated with these installed pipe supports.

Within this area no violations or deviations were identified.

4. Review Of Quality Assurance Manual (35100)

The inspector selected five nonconforming conditions observed during field inspections to verify the licensee's compliance with NQAM Part 1, Section 2.16, Revision 4, "Corrective Action". The conditions observed were previously identified by the licensee and each deficiency was identified with an attached equipment trouble tag. The tag numbers and deficiencies are listed below:

- Tag 18158, "Bottom right hand bonnet nut loose on item 1-DRV-77-1060".
- Tag 18656, "Electrical penetration 1-PENT-293-3 has 14 bolts missing".
- Tag 6111, "Flex cable on instrument panel 11-351A has both nuts missing on the two piece clamp".
- Tag 19546, "Bottom baseplate bolt loose".
- Tag 1082, "Electrical flex clamp loose on back of panel 1-PT-1-27B-E".

The deficiencies were documented on MRs for corrective actions. As stated in Section 2.16, Revision 4, Paragraph 2.1.2.0, a CAQR would be required if a confirmed adverse trend in activities identified by trend analysis were to be found.

The inspector reviewed the licensee's program for trending of MRs to ascertain if the above identified similar deficiencies, i.e., loose connections, were being trended. The inspector found the maintenance department has a program for trending MRs, however, the trending is based on equipment failures, e.g., bearing failures, and not on construction hardware deficiencies like the items discussed above.

This item is identified as URI 390, 391/88-05-01, "Trending of Maintenance Requests", pending the licensee's evaluation of the adequacy of the maintenance request trending program for compliance with NQAM Section 2.16, Revision 4.

5. Safety Related Piping - Record Review (49065)

The inspector reviewed the records for eight ASME Code welds which were deleted from the system in December 1987 due to the adjacent valves being removed and sent to the Sequoyah Plant. The review was performed to assure that the ASME Code Data N-5 program reflected the installed configuration. The records reviewed were for welds removed from the ERCW piping to the lower containment coolers:

- 1-067C-D297-2
- 1-067C-D297-3
- 1-067GT-390-1, 2, 3
- 1-067GT-391-1, 2, 3

AI - 9.4.2, "Control of Weld Documentation", is the document which controls welding activities to ensure the process is performed, inspected, and documented in accordance with the NQAM, as applicable. Appendix A of AI - 9.4.2, titled "Weld Maps and Weld Accountability Program" (WAP), requires that the WAP be updated for each code weld that has been affected by field activities. Attachment 1 of AI - 9.4.2 must be completed and sent to the Document Control Section (DCS) or the QA Code Data Unit (QACDU) when welds are modified or deleted. The QACDU is responsible for encoding the symbol "D" on the WAP for welds that have been deleted by field activities.

The inspector's review of the eight listed welds found that the WAP had not been updated to reflect the deleted welds. The QACDU was unaware that the welds had been deleted because the appropriate forms were never forwarded to the QACDU, as required. The inspector found the appropriate form, Attachment 1 to AI - 9.4.2, was properly filled out and attached to the Maintenance Request Form A as required, however, it was not forwarded to the QACDU. Further review found that the licensee had issued a CAQR number WBQ 880496 on July 25, 1988, and identified nine other welds which

were not updated on the WAP as required. The proposed corrective action was to review all work activities (workplans, maintenance requests, etc.) involving ASME Code welds to ensure that similar problems do not exist. Final corrective actions which would ensure that ASME Code welds are properly documented were not specified. Also, corrective actions to prevent further recurrence were not apparent. This item was identified by the licensee prior to this inspection, therefore, a violation is not being issued at this time. This item is identified as URI 390, 391/88-05-02, "Accountability of ASME Welds", pending NRC review of licensee corrective actions on these apparent violations.

6. Welding - Visual Inspections (57050)

The inspector accompanied EG&G inspection personnel during Unit 2 piping weld reinspections to assess the adequacy of the reinspection program. EG&G was contracted to perform an independent evaluation of welding activities at Watts Bar Units 1 and 2. The Unit 1 independent evaluation is complete and Unit 2 field inspections recently commenced.

The following welds were reinspected by EG&G in the presence of the NRC inspector:

- Weld 2-070B-T141-31, two inch socket weld, ASME Code Section III, Class 3.
- Weld 2-067J-T546-03, one and one-half inch socket weld, ASME Code Section III, Class 3.
- Weld 2-067J-T551-11, one and one-half inch socket weld, ASME Code Section III, Class 3.
- Weld 2-067C-T657-05, one and one-half inch socket weld, ASME Code Section III, Class 3.

The EG&G inspector performed visual inspection to EG&G licensee approved procedure SP.3.2.4. Weld 2-067J-T551-11 was rejected by the EG&G inspector with a 1/32 inch surface porosity as required by the acceptance standard.

The review found the EG&G inspector to be familiar with the procedure, adequately qualified to perform the inspections, and very conservative in the evaluations. All areas reviewed by the inspector were found acceptable.

7. Electrical - Procedure Review (51061)

The inspector reviewed General construction Specification, G-38, "Installing Insulated Cables Rated Up To 15,000 Volts", to determine the technical requirements of supporting electrical cable in vertical raceways. Paragraph 3.2.1.8.2 (e) states; "Cable support spacing shall be

in accordance with NEC 300-19. Cable ties may be used to provide support of cables in trays". The inspector questioned engineering personnel regarding the adequacy of using cable tie wraps made of nylon for long term (40 years +) supporting of vertical cable and also their adequacy during a seismic event. Following this discussion, engineering advised that a CAQR, number WBP 8805 64P was being issued to address this concern. The engineers further advised that tie wraps were not acceptable for supporting cable in vertical raceways, contrary to the position stated in G-38. The engineering department plans to revise G-38 and delete the statements that allow tie wraps as supports of electric cable in vertical trays. This item is identified as URI 50-390, 391/88-05-03, "G-38 Specification Deficiency", pending review of the licensee's disposition of the CAQR and revision of G-38.

8. Action on Previous Inspection Findings (92701)

- a. (Closed) URI 390, 391/87-18-02, Ineffective Followup On Audit Findings.

This violation resulted from a failure to correct training deficiencies identified in 10 audits by the licensee during a period from 1985 until January 1987.

The licensee has taken the following corrective actions on this item:

- Engineering Assurance (EA) reviewed the training deficiencies identified by EA performed in 1985 - 1987 and issued a Condition Adverse to Quality Report (CAQR) to address corrective actions.
- EA performed the fiscal year 1987 trend analysis of deficiencies identified by EA audits. No additional adverse trends were found.
- Nuclear Engineering Procedure (NEP) - 9.2, Revision 0, "Trending of Conditions Adverse to Quality", was revised by interim Order dated February 29, 1988, effective immediately. This order added the requirement for issuance of an annual trend data report for EA.
- NEP - 1.4, "Audits", was issued to provide more direction to organizations responding to audits performed by internal and external organizations. The procedure was issued May 22, 1988.
- EA Instruction 65.04, "Engineering Assurance Internal Audit Program", was revised February 29, 1988, to require annual analysis of the trend data report of EA audits.
- Personnel were trained to the new or revised documents discussed above. The training was documented in accordance with NEP -1.2, "Training".

The inspector reviewed the following listed documents in reference to this item:

- CAQR, KXF870240, Rev. 0
- NEP - 9.2. Rev. 0, "Trending of Conditions adverse to Quality".
- NEP - 1.4, "Audits".
- EA Instruction 65.04, "Engineering Assurance Internal Audit Program".
- Training posted for NEP 1.4, 9.2, and EA instruction 65.04.

All areas reviewed by the inspector were found acceptable and this item is closed.

- b. (Closed) IFI 390/86-16-03, 391/86-16-02, Disposition of Welding Materials Received From Airco Welding Products.

This inspector followup item identified the following concern:

As a result of a 10CFR Part 21 notification from a nuclear facility, an NRC Vendor Program Inspection of Airco Filler Metals, Cleveland, Ohio, was conducted on January 27 -31, 1986. Several nonconforming conditions were identified at Airco Filler Metals regarding the fabrication of weld material which potentially could affect E7018 electrodes supplied to the licensee. The part 21 notification reported incomplete flux coating of a significant number of E7018 electrodes. The NRC inspection found violations in the area of specifying part 21 as an applicable requirement on purchase orders issued to subcontractors for calibration services, machining services and stress relieving services. The inspection also identified nonconformances in the areas of internal audits, auditor qualifications, control of measuring and test equipment, nondestructive examination personnel qualifications, training and quality assurance indoctrination, and procurement practices.

The item was identified as an inspector followup item pending review of the licensee's disposition of these electrodes.

On August 5 - 6, 1986, the licensee conducted an investigation at Airco Welding Products (Airco) to determine if materials purchased by the licensee from Airco were affected based on the NRC findings discussed above. Based on this investigation, the licensee has concluded that the Airco filler materials supplied to TVA are acceptable as is and that Airco filler metals should not be considered an acceptable TVA supplier until resolution of the NRC-identified discrepancies and a subsequent re-evaluation of the Airco quality program has been conducted.

On August 25, 1986, Airco advised NRC that on August 15, 1986, the assets and inventory of the Cleveland facility were sold to the Lincoln Electric Company and the plant was closed. Additionally, the letter advised that ASME has taken the position that Lincoln will be unable to ship to nuclear customers under the Airco label any material that was previously manufactured under the Airco QA program.

The inspector reviewed the licensee's investigation/evaluation of Airco which concluded the material supplied to TVA was not adversely affected based on the NRC audit findings. The inspector concurs with this conclusion and this item is considered closed.

- c. (Closed) IFI 390/84-22-22, 391/84-17-22, Damage Control/Corrective Actions; Maintenance Equipment and Supplies.

This inspector followup item identified seven inspector concerns in the area of Emergency Preparedness. NRC Inspection Report 390/85-16, 391/85-15 documented additional comments related to the original concerns, including recommendations for additional corrective action. These recommendations were reviewed by the Region II Emergency Preparedness Section Staff, and it was determined that no regulatory requirements existed. Therefore this IFI was administratively closed.

9. Vertical Slice Review (VSR) (37051)

a. VSR Team Independence

On June 24, 1988, TVA submitted the Vertical Slice Review Plan to NRC for review and concurrence. NRC responded by letter dated August 31, 1988, and concurred in the plan and provided comments on the plan. In TVA's letter, S&L is described as the independent contractor selected to perform the VSR. To assure this independence, the Watts Bar Program Team (WBPT) implemented a procedure (WBPT-19) which required each prospective member of the VSR Team complete an objectivity questionnaire describing: (1) previous or current involvement in Watts Bar activities, (2) previous or current involvement of their immediate family members in Watts Bar activities, (3) ownership in companies performing contracted services to TVA, and (4) promises of additional compensation contingent on a position taken on a VSR issue.

Procedure WBPT-19 also established the following acceptance criteria:

- (1) If all the responses are "no" on the Objectivity Questionnaire, the prospective VSRT personnel shall be deemed as acceptable from an objectivity and independence viewpoint.
- (2) If the prospective VSRT personnel have a minimum level of previous or current WBN involvement, this may be acceptable if:

- (a) Their involvement was only in the form of management overview.
- (b) Their involvement was limited to a small number of man hours, i.e., less than one year full time or equivalent. However, their acceptance will be based on one of the following conditions:
 - i. Their role in the VSR will not include the area which they had previous involvement in.
 - ii. The end product of their work was never issued or made into an official record.

Each completed questionnaire was subsequently reviewed by the WBPT QA member to determine if the objectivity and independence of the prospective VSRT member was acceptable. Any special limiting conditions were also established by this reviewer.

In discussions, the WBPT - QA member stated that he reviewed the questionnaires and, for those where he needed more information about the specific tasks performed by a prospective VSRT member, inquiries were made to the specific individual or the individual's supervisor. Additional reviews of the questionnaire were performed by at least one other WBPT member and an Engineering Assurance representative.

The inspector reviewed the objectivity questionnaires and their disposition for a sample of 32 individuals. Fourteen of these individuals had some level of prior involvement with Watts Bar. This set of 14 individuals included the Project Director, Project Manager, members of the Internal Review Committee, Engineering Verification Manager, Construction and QA/QC Records Verification Manager and the Mechanical System Project Engineer. Involvement ranged from only several hours of management overview to substantial efforts in design criteria development or calculations review programs. With the exception of the questionnaire for the Engineering Verification Manager, all questionnaires were evaluated and dispositioned adequately. In several cases, specific restrictions were imposed on the work to be performed by that individual. Following discussions with the WBPT QA member and his rereview of the Engineering Verification Manager's questionnaire, appropriate restrictions were placed on the EV manager's work. In addition, the WBPT developed a procedure change to track VSRT member work assignments during the VSR to assure no conflict will exist. This tracking is to be done by S&L and adequate implementation by S&L is to be reviewed during future TVA - QA audit of S&L VSR activities.

b. Construction Verification (CV)

The VSR project review plan states, "The objective of the CV review is to verify that as-constructed elements are in conformance with the design output documents in effect on the cut off date." April 22, 1988, was selected as the cut off date.

The Vertical Slice Review is being performed under contract from TVA with S&L engineering firm. For the construction verification (CV) and records verification (RV) portions of the review, S&L contracted with Fluor Daniel (FD) to provide inspectors to actually perform the on site inspections. The main body of FD inspectors are qualified as ANSI N45.2.6 Level II inspectors. Several are also qualified as Level III inspectors who review the work performed by the Level II inspectors. Also, the Level III inspectors independently reinspect about 10% of the work of the Level II inspectors.

In preparation for field inspections, component specific inspection packages are developed by S&L engineers located at the Watts Bar site. These packages contain a checklist of attributes to be verified along with TVA design or Vendor drawings describing the component to be field verified. As an example, the CV checklist for switch gear and motor control centers contain attributes such as: location and orientation, support and mounting, field modifications, name plate, dimensional relationships, terminal blocks, separation, identification, physical protection, and cables in air. A portion of the internal training for the FD inspectors consisted of going into the plant with S&L engineers to inspect the attributes of several checklists to assure the inspectors were clear on what inspections were necessary for each of the attributes of the checklists.

CV inspections began about mid August and continued through the inspection period. The target for completion of the field work is September 30, 1988, although some delays have been experienced and the schedule may extend beyond that time.

The inspector monitored the performance of the CV inspections by direct observation of the FD field inspectors, and independent inspections performed using selected CV checklists and comparing the NRC results with CV documented results. The inspector concluded the inspections by FD inspectors were adequate to identify deficiencies with the design drawings.

For those items rejected by the inspector, an Inspection Report (IR) was developed which provided a description of the as-found condition that was considered rejectable. These IR's are subsequently reviewed and developed into Observation Reports (OR) for further processing to resolve the concern. This is discussed later in section C. None of the CV rejected items have yet been completely processed through the VSR team and sent to the TVA line organization for resolution. The

CV team projects that about 60 ORs will be processed in the later part of September.

c. Findings By The VSRT

Findings resulting from the engineering verification, construction verification and records verification efforts are formalized as observation reports. An observation is defined as "a design, construction, or records related condition which is perceived by a reviewer or inspector to be in nonconformance with the licensing or other documents imposing safety-related requirements". These ORs are reviewed and evaluated by the VSR Internal Review Committee and if the committee agrees that a discrepancy exists a Discrepancy Report (DR) is developed and formally sent to the TVA-WBN line organization for resolution. If an OR is subsequently confirmed by the VSRT to be in conformance with licensing or other documents imposing safety-related requirements, the OR is considered as Non-Discrepant. The basis for that determination is documented and no further action is taken on non-discrepant ORs.

The WBN line organization reviews the ORs and formally proposes a resolution and a determination of design and/or safety significance of the OR. The VSRT and the WBPT review the line organization's proposed resolution for acceptance. To date, 95 ORs and 21 DRs have been received by TVA. Proposed resolution reports for DR-1, -2, -3, -5 and -11 have been returned to the VSRT for review. None of the proposed reports have yet been formally accepted by the VSRT.

The inspector monitored a meeting of the TVA-WBN line organization to establish a plan for resolution of DR-9. DR-9 dealt with the lack of inspection documentation for a radiation monitoring instrument. During the discussion, the line organization identified a number of similar cases. Questions arose regarding how broad the proposed resolution should be to this DR. The line organization expressed the need to address the issue on a narrow scope in order to meet the five day turn-around target for resolution reports. The EA representative and NRC expressed concern regarding taking too narrow an approach to the resolution of the issue to meet the target date. The inspector and EA representative subsequently discussed the issue with the WBPT and the WBPT issued additional guidance to the line organization on items to be addressed in responses to discrepancies. The line organization plans to incorporate revised guidance in site procedure AI-11.3.

d. Status of the VSR

During the report period, the VSR is estimated to be about 50% complete. CV is about 60% complete, EA about 35%, and RV about 60% complete. The final number of observation reports is estimated to be in the range of 200 to 400. Since ORs can be grouped together in one DR, there will be correspondingly fewer DRs.

10. Exit Interview

The inspection scope and findings were summarized on September 20, 1988, and September 22, 1988, for the VSR with those persons indicated in paragraph one. The inspectors described the areas inspected, the VSR findings, and discussed in detail the inspection results listed below. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspectors during this inspection. Dissenting comments were not received from the licensee.

<u>Item Number</u>	<u>Status</u>	<u>Description and Reference</u>
390, 391/88-05-01	Open	URI - Trending of Maintenance Requests, Paragraph 4.
390, 391/88-05-02	Open	URI - Accountability of ASME Welds, Paragraph 5.
390, 391/88-05-03	Open	URI - G-38 Specification Deficiency, Paragraph 7.
390, 391/87-18-02	Closed	URI - Ineffective Followup On Audit Findings, Paragraph 8a.
390/86-16-03 391/86-16-02	Closed	IFI - Disposition Of Welding Materials Received From Airco Welding Products, Paragraph 3b.
390/84-22-22 391/84-17-22	Closed*	IFI - Damage Control/Corrective Actions, Maintenance Equipment and Supplies, Paragraph 9c.

*Administratively Closed in Inspection Report based on inhouse review.

10. List of Acronyms and Initialisms - Unit 1 and 2

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
CAQR	Condition Adverse to Quality Report
CV	Construction Verification
DCS	Document Control Section
DR	Discrepancy Report
EA	Engineering Assurance
ERCW	Essential Raw Cooling Water
EV	Engineering Verification
FD	Fluor Daniel
IR	Inspection Report
IRC	Internal Review Committee
MR	Maintenance Request
NEC	National Electric Code

NEP	Nuclear Engineering Procedure
NQAM	Nuclear Quality Assurance Manual
NRC	Nuclear Regulatory Commission
OR	Observation Report
OSP	Office of Special Projects
QA	Quality Assurance
QACDU	Quality Assurance Code Data Unit
RV	Records Verification
S&L	Sargent and Lundy
TVA	Tennessee Valley Authority
URI	Unresolved Item
VSR	Vertical Slice Review
VSRT	Vertical Slice Review Team
WAP	Weld Accountability Program
WBN	Watts Bar Nuclear Plant
WBPT	Watts Bar Program Team