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

Report Nos.: 50-390/83-05 and 50-391/83-04

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

Docket Nos.: 50-390 and 50-391

License Nos.: CPPR-91 and CPPR-92

Facility Name: Watts Bar 1 and 2

Inspection at Watts Bar site near Spring City, Tennessee

Inspector: _____ 4/6/83
J. K. Coley Date Signed

Approved by: _____ 4/6/83
J. J. Blake, Section Chief Date Signed
Engineering Program Branch
Division of Engineering and Operational Programs

SUMMARY

Inspection on February 28 - March 4 and March 15-18, 1983

Areas Inspected

This routine, unannounced inspection involved 65 inspector-hours on site in the areas of licensee action on previous enforcement matters (Unit 1), independent inspection effort (Units 1 and 2), preservice inspection - observation of work and work activities (Unit 1), preservice inspection - review of quality records (Units 1 and 2), safety related structures - observation of work and work activities (Unit 2), safety related structures - review of quality records (Unit 2), licensee identified items (Units 1 and 2), and IE Bulletin 82-04.

Results

Of the eight areas inspected, no violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

   Licensee Employees

   **G. Wadewitz, Project Manager, Watts Bar Construction
   *R. Pierce, Project Manager, DEDC
   ***S. Johnson, Quality Manager
   **R. Olson, Construction Engineer
   ***T. Hayes, Nuclear Licensing Unit, Watts Bar
   ***H. Fischer, Assistant Construction Engineer
   ***J. Engelhardt, Nuclear Power Compliance, Watts Bar

   Other licensee employees contacted included construction craftsmen, technicians, operators, and office personnel.

   NRC Resident Inspector

   W. Swan, Senior Resident Inspector, Construction
   T. Heatherly, Senior Resident Inspector, Operations

   *Attended exit interview on March 4, 1983
   **Attended exit interview on March 18, 1983
   ***Attended exit interviews on March 4, and March 18, 1983

2. Exit Interview

   The inspection scope and findings were summarized on March 4 and March 18, 1983, with those persons indicated in paragraph 1 above. The licensee was informed of the inspection findings listed below. The licensee acknowledged the inspection findings with no dissenting comments.

   Unresolved Item 50-390/83-05-01, Hydrostatic Test Controls Appear Inadequate, paragraph 6.

   Inspector Followup Item 50-390/83-05-02, 50-391/83-04-01, Inadequate Care and Preservation of Electrical Equipment, paragraph 5.c.

3. Licensee Action on Previous Enforcement Matters

   (Closed) Violation 390/82-17-01, Failure to Take Adequate Corrective Action to Identify Alteration on Supports. TVA corrective action letters dated July 15, 1982, October 22, 1982, and January 19, 1983, have been reviewed by Region II and found acceptable. The inspector held discussion with the cognizant unit supervisor and performed a walk down inspection of Units 1 and 2 to verify the adequacy of the locking devices on piping supports and

to insure that corrective action taken by the licensee will prevent unauthorized work on hangers that have been QA accepted. The inspector concluded that TVA has determined the full extent of the subject violation, performed the necessary follow-up actions to correct the present conditions, and developed the necessary corrective actions to preclude recurrence of similar circumstances.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. New unresolved items identified during this inspection are discussed in paragraph 6.

5. Independent Inspection Effort - Units 1 and 2 (92706)

The inspector conducted several inspections of the Units 1 and 2 reactor building, auxiliary building, control room, and post accident sampling rooms to observe construction activities such as welding, welding filler material controls, housekeeping, care and preservation of equipment, and material controls. In addition, a select sample of ten radiographs on the Unit 1 steam generator blowdown system were reviewed to determine the quality of these recently completed welds, and to determine the quality of the radiographic and inspection techniques used. Specific items inspected are listed below, as well as the inspector's findings and comments.

a. Welding: In addition to the safety related structures addressed specifically in paragraphs 8 and 9 of this report, the inspector performed a general inspection of the auxiliary building to obtain a broader view of structural fabrication and welding. This inspection revealed two Class C hangers with welds that the inspector felt may be insufficient. The supports were identified as 47A450-4-35 (weld No. FWOS-1-67-F22-44) and 47A-060-3-34. Drawings and FCRs for the above welds were reviewed and measurements taken of the weld fillets. Both of the aforementioned welds were found to be satisfactory.

b. Welding Filler Material Controls: During the inspector's surveillance of the work areas, filler material controls were verified. During the week of February 28 - March 4, 1983, several partially burnt weld rods were found in a trash dumpster within the plant. The inspector's overall assessment of filler material controls, however, was very favorable. The inspector opened an unresolved item on this subject during the March 4, 1983 exit meeting, until additional surveillance could be made by the inspector to determine if the effectiveness of recent changes made by TVA in weld filler material controls were adequate. These controls required the welder to return the unused filler materials and weld rod stubs to the rod rooms, in lieu of putting them in drop boxes. On March 15, 1983, the inspector conducted another surveillance inspection of work areas at Watts Bar to verify

weld filler material controls. The inspector was again favorably impressed with the site filler material controls and concluded that the weld rods found during the week of February 28 - March 4, 1983, was an isolated case. The unresolved item was removed from the report in the March 18, 1983 exit meeting.

c. Housekeeping, Care and Preservation of Components: Surveillance inspections made by the inspector also included verification of good housekeeping and care and preservation of components. One area of concern was noted in the Units 1 and 2 post accident sampling rooms. Electric panels were observed open with the inside of the panels being used as storage areas for several trades. Lead wool was also observed being packed between installed panels with an air hammer, without protective measures being taken for the panel instruments, gauges, etc. Modifications were being made in the concrete ceiling over the panels and a work bench with loose hangers was adjacent to the unprotected front of one panel. After discussions with the project engineer and licensing personnel at Watts Bar and Knoxville, it was concluded that all instruments on the aforementioned panels were not safety related. The inspector expressed his concern, however, that expensive electrical equipment and instrumentation was subjected to unacceptable care and preservation practices. The licensee had the panels cleaned and protected. The inspector noted that the degraded conditions found in the post accident sampling rooms did not accurately reflect the overall condition of the plant, which was assessed by the inspector as acceptable. In order to insure that safety related electrical panels received closer review by Region II engineers, the inspector opened Inspector Followup Item 390/83-05-02 and 391/83-04-01, Inadequate Care and Preservation of Electrical Equipment.

d. Material Control Verification: In order to insure that materials used at Watts Bar were in accordance with design drawings as to material type and thickness, the inspector using Region II ultrasonic equipment, took material velocity and thickness readings on Dravo spool pieces in the reactor and auxiliary buildings. The spool pieces listed below were verified from the actual readings obtained by the inspector to the design drawing requirements. Other spool pieces were verified but not traced to drawings and records because their readings were never questionable to the inspector.

Weld Map No.	Shop Traveler No.	System
IC-197	SK-1636, 1635, 1634	Safety Injection
IC-198	SK-1645, 1646	Safety Injection
IC-20 & 18	SK-47 & 62	Upper Head Injection
IC-145	SK-1302	Reactor Coolant
IC-145	SK-1304	Reactor Coolant
IC-33	SK-287, SK-288	Residual Heat Removal
IC-137	SK-1367	Chemical & Volume Control

Thickness readings for the above spool pieces were consistently below nominal wall but above the minimum wall thickness required.

e. Review of Radiographic Film: The inspector selected ten welds on the Unit 1 steam generator blowdown system to perform visual inspection and to review the radiographs of these welds. These welds were chosen because they had been recently been completed and the inspector was interested in obtaining some assurance that new welders and inspection personnel were performing satisfactorily. Radiographs for the following ASME, Class B welds were reviewed:

Weld No.	Weld Joint Size
1-015A-T002-11C1	4" diameter x .337" wall
1-015A-T015-13C1	2" diameter x .343" wall
1-015A-T030-25C1	4" diameter x .337" wall
1-015A-T015-27C1	4" diameter x .337" wall
1-015A-T015-26C1	4" diameter x .337" wall
1-015A-T013-22	4" diameter x .337" wall
1-015A-T007-26	4" diameter x .337" wall
1-015A-T024-16C1	2" diameter x .343" wall
1-015A-T030-01C1	4" diameter x .337" wall
1-015A-T013-30	4" diameter x .337" wall
1-015A-T013-24	4" diameter x .337" wall

Within the areas examined, no violations or deviations were observed.

6. Preservice Inspection - Observation of Work - Unit 1 (73053B)

The inspector observed a hydrostatic pressure test described below to determine whether preservice inspection of Class 1, 2, and 3 pressure retaining components are performed in accordance with regulatory requirements and licensee's commitments. Preservice inspection (PSI) is being performed in accordance with ASME Boiler and Pressure Vessel Code, Section XI, 1974 Edition, with addenda through S75. However, Section XI of the ASME Code allows the licensee to use hydrostatic and visual test results required by Section III of the Construction Code as acceptable preservice system hydrostatic pressure test. The Construction Code for Watts Bar Unit 1 is the ASME B&PV Code, Section III, 1971 Edition, with addenda through S73.

The inspector observed the hydrostatic pressure test of the steam generator blowdown system for loop 1 on February 28, 1983. This was a Class B system and was to be performed in accordance with Watts Bar Quality Control Test Procedure WBNP-QCT-4.37 R-1.

The following attributes were verified to ensure that the pressure test was consistent with the test procedure and Section III of the ASME Code:

a. Test conditions of pressure and temperature
b. Test conditions holding time
c. Rate of temperature and pressure increase
d. Pressure and/or temperature measuring instrumentation
e. Source of detected leakage located, evaluated, and corrective measure taken
f. Gauges calibrated prior to test
g. Leakage from valves directed away from area of interest to avoid masking leakage from weld joints.

As a result of observing the above test, the inspector noted the following areas of concern:

a. The system was vented to remove trapped air when the system was near the hydrostatic pressure of 1570 PSI. This resulted in the system and area becoming sprayed with water. This could lead to masking of leakage from weld joints and damaging electrical equipment in area.

b. Pump operators should be in visual contact with the test gauge. A relay man was used in this test.

c. Rate of pressure increase was too rapid, due partly because of the inability of the pump operator to see the test gauge directly. This very nearly caused the system to be overpressurized.

d. The system was not tagged to indicate that a pressure test was being performed on it and thus avoid someone from inadvertently opening a valve.

e. The QC inspector did not appear familiar enough with the test gauge to know the value of each gradient on the gauge.

f. During the inspector's walkdown of the system, while maintaining hydrostatic pressure, the inspector observed tape on several weld joints. The inspector had not observed QC removing the tape during their inspection. QC, however, contended that the tape was removed and put back. Tape on weld joints could mask leakage. The licensee's test director, who accompanied the inspector, did remove this tape, however, in all but one case.

The inspector subsequently held two meetings with Watts Bar engineering and QC management personnel to discuss the hydrostatic test. The first meeting was held on March 1, 1983, to alert the proper level of management of the inspector's concerns and to provide management adequate time to look into this problem. The second meeting was held on March 3, 1983. The basic concern discussed in the meeting was the apparent lack of attention to detailed procedural and code requirements. All parties agreed that the test results were satisfactory, but that prompt action in order to strengthen the awareness of testing personnel to detailed requirements was needed. This item was reported in the March 4 exit meeting, as Unresolved Item 390/83-05-01, Hydrostatic Pressure Test Controls Appear Inadequate.

On March 15, 1983, the inspector returned to the site. Hydrostatic pressure testing was an inspection priority and on March 17, 1983, the inspector observed the hydrostatic pressure test on System 41 (Lay-up Water). This system however, was not safety related. The inspector observed a detail briefing of all test personnel by the test director using an outline developed from experiences noted above. This test was performed in a controlled and professional manner. Unresolved Item 390/83-05-01, however, will remain open until Region II is fully satisfied that test controls for system pressure tests are firmly in place.

Within the areas examined, no violations or deviations were observed.

7. Preservice Inspection - Data Review and Evaluation - Units 1 and 2 (73055B)

The inspector reviewed PSI records to ascertain whether the NDE data covers the scope of examination as described in the applicable ASME Code, the safety analysis report, and the licensee's PSI program. PSI data files were also reviewed to determine whether the data was within previously established acceptance criteria. The applicable code for this review was the ASME Boiler and Pressure Vessel Code, Section XI, 1974 Edition, with addenda through S75. Quality records for the following welds were reviewed:

Weld No.	System	Weld Classification	Size	Unit
SIF-115-L3	Safety Injection	Pipe Weld	10" Dia.	1
SIF-D091-3	Safety Injection	Pipe Weld	12" Dia.	1
UHIF-D0040-5	Upper Head Injection	Pipe Weld	8" Dia.	1
UHIF-D0040-9	Upper Head Injection	Pipe Weld	100% of Weld	1
SG-4B-5-1	Steam Generator	Vessel Weld	100% of Weld	1
WC5-C6	Reactor Vessel	Vessel Weld	100% of Weld	2
W04-05	Reactor Vessel	Vessel Weld	100% of Weld	2
W03-04	Reactor Vessel	Vessel Weld	100% of Weld	2

Records for the above welds were reviewed to ascertain whether selected records contained or provided reference to the following documents and to determine whether these documents met ASME Code requirements:

a. Examination results and data sheets
b. Examination equipment data
c. Calibration data sheets
d. Examination evaluation data
e. Records on extent of examination
f. Records on deviation from program and procedures including justification for deviation.

Within the areas examined, no violations or deviations were observed.

8. Safety Related Structures - Observation of Work and Work Activities - Unit 2 (55064B)

The inspector observed and evaluated work performance of completed work and work in progress to ascertain whether activities relative to field welding of safety related structures and supports outside the containment were being accomplished in accordance with NRC requirements and SAR commitments. The applicable code for this work is the ASME B&PV Code, 1971 Edition, with addenda through S73, as implemented by TVA's General Construction Specification, G-43. The following work and activities were observed:

Weld No.	Phase of Fabrication	Support or Structure
920-31-53-3	Fitup	Hanger
920-31-51-3	Fitup	Hanger
920-31-52-3	Fitup	Hanger
47A437-3-4	Fitup	Hanger
920-31-51-3	Inprocess	Hanger
920-31-52-3	Inprocess	Hanger
920-31-57-3	Inprocess	Hanger
70-2CC-R14	Completed	Hanger
70-2CC-R13	Completed	Hanger
70-2CC-R12	Completed	Hanger
*PD-07-19 Item W-14X119	Fitup	Structure
*PD-07-19 Item W-14X264	(2) Fitups	Structure
*PD-07-19 Item W-14X119	Inprocess	Structure
*PD-08-18 I-Beam	Completed	Structure
**PD-08-18 I-Beam	Completed	Structure
**PD-08-18 Cross Over & Center Support	Completed	Structure

NOTE: *Drawing used for PD-07-19 is 48W1707-19-R-5
**Drawing used for PD-08-18 is 48W1708-11-R-13

The work described above was observed to determine whether the requirements of applicable specifications, standard, work procedures, and inspection procedures were being met as follows:

a. Fitup

(1) weld identification/location
(2) joint preparation and alignment
(3) evidence of QC verification

b. Inprogress

(1) weld identification/location
(2) use of applicable weld procedure
(3) welders performing the weld currently qualified for position being welded

(4) use of specified weld material
(5) Procedures used to remove and repair defects
(6) Physical appearance of the weld
(7) NDE performed at proper stage of fabrication
(8) periodic checks made to assure that welding variables are within specified limits.

In addition to the above, the inspector verified that welding material issue stations were in conformance with the requirements of applicable QC and work performance procedures in the following areas:

Storage of Materials

a. Identification
b. Segregation
c. Cleanliness
d. Temperature Control
e. Issue records
f. Handling of return materials

During the observation of welding activities the inspector also verified that there was no unused filler material in the areas and that adequate QC personnel were present.

Within the areas examined, no violations or deviations were observed.

9. Safety Related Structures - Review of Quality Records - Unit 2 (55065B and 55066B)

The inspector reviewed the quality records of safety related steel structures and supports outside containment, to ascertain whether the records reflect work accomplishment consistent with NRC requirement and SAR commitments. The applicable code for this review is delineated in paragraph 8 above. Records for the following welds were reviewed:

Hanger/Support No.

70-2CC-R-14
70-2CC-R-12
PD-08-18
PD-08-19 (Item 48W1708-11-12-22)
PD-08-10 (Item 48W1708-11-13-822)
47A450-4-35 (FWOS-C1-67-F-22-44)
47A060-3-34

Records for the above component were reviewed to determine whether these records reflected work accomplishment consistent with NRC requirements and SAR commitments in the following areas:

a. Inspection records covering visual and dimensional inspections
b. Weld history records
c. Heat treatment records as applicable
d. NDE records
e. Weld repair records
f. Welding material control records
g. Welder qualification records
h. Inspector qualification records

Within the areas examined, no violations or deviations were observed.

10. Licensee Identified Items - Units 1 and 2 (92700B)

(Closed) CDR 50-390/82-53 and 50-390/82-50, "Omission of Some Movements in Input to Evaluate Pipe Interferences". TVA letters dated June 18, 1982, and February 4, 1982, have been reviewed and found to be acceptable by Region II. TVA's letter dated February 4, 1983, indicated that TVA does not now consider this nonconforming condition to be adverse to the safe operation of the plant. Therefore, TVA deleted this item as a 50.55(e) item (CDR). The inspector reviewed TVA's revised Construction Specification N3C-912 used for evaluating piping clearances needed for preventing interferences. The inspector concurs with TVA's evaluation and this item is considered closed.

(Closed) CDR 50-390, 391/81-04-01, "Improper Weld Attachment of Shear Lugs". On October 30, 1980, TVA notified Region II of a potential 50.55(e) item concerning shear lugs that were not installed in accordance with applicable drawings and welding procedures in the HVAC chilled water system (31). This item was confirmed reportable on December 1, 1980. The final construction deficiency report was submitted on January 26, 1981.

The final report has been reviewed and determined acceptable by Region II. During this inspection, discussions were held with the licensee and corrective action examined to determine adequacy and completeness in accordance with the licensee's report. After performing a reinspection of shear lugs on "System 31", the inspector concluded that the licensee has determined the extent of the reported condition and performed the necessary survey and followup action to correct this condition.

(Closed) CDR 50-390/81-82 and 50-391/81-76, "Design of Axial Supports for Piping Using Lugs Welded to the Pipe". On September 22, 1981, TVA notified Region II of a potential 50.55(e) item concerning lugs, designed to keep piping from moving axially, butt up against the rounded corner of square tubing on pipe supports allowing greater movement than designed for. In addition, the criteria for determining the movement arm of the centroid of the bearing area has been misinterpreted. Interim reports were submitted by TVA on October 22, 1981, March 16, 1982, August 31, 1982, and a final report on January 27, 1983. During this inspection, discussions were held with the licensee and corrective action examined to determine adequacy and

completeness in accordance with the licensee's report. The inspector concluded that the licensee has determined the extent of the reported condition and performed the necessary survey and followup action to correct this condition.

(Closed) CDR 50-390/81-61 and 50-391/81-57, "HVAC Piping Configuration". On July 9, 1981, TVA notified Region II of a potential 50.55(e) item concerning Watts Bar Nuclear Plant heating, ventilating, and air-conditioning (HVAC) system chilled water piping and associated hangers that were not installed in the locations or in the configuration shown on the appropriate construction drawings. Piping and hangers were installed out of tolerance and not as specified in General Construction Specification G-43. The piping and hangers were installed between December 1977 and September 1980, which was before implementation of QA controls for the HVAC system. TVA submitted a final report on August 10, 1981, and supplementals to the final report on April 15, 1982, and June 18, 1982. During this inspection, discussions were held with the licensee and corrective action examined to determine adequacy and completeness in accordance with the licensee's report. The inspector concluded that the licensee has determined the extent of the reported conditions and performed the necessary survey and followup action to correct this condition.

(Closed) CDR 50-390/81-49, "Power Operated Relief Valves Do Not Meet Requirements". On May 6, 1981, TVA notified Region II of a potential 50.55(e) item concerning hangers that had been installed for the component cooling and residual heat removal systems using design drawing specifying attachment to the shield building; however, the analysis isometric and its companion load tables specify attachment to the auxiliary building. In addition, hangers representing a single node point on the safety injection system were attached to the auxiliary building and the shield building. This difference in anchor location can introduce stresses in the pipes which had not been evaluated during the analysis. This deficiency occurred due to the design employees' failing to identify discrepancies between isometric and design drawings when reviewing the design drawings.

During this inspection, discussions were held with the licensee and corrective action examined to determine adequacy and completeness in accordance with the licensee's report. The inspector concluded that the licensee has determined the extent of the reported condition and performed the necessary survey and followup action to correct this condition.

(Closed) CDR 50-390/82-18 and 50-391/82-17, "HVAC Register Damage". On January 25, 1982, TVA notified Region II of a potential 50.55(e) item concerning HVAC registers which were required to balance airflows through the plant having been damaged because of construction activities in the vicinity of the installed registers. TVA submitted interim reports to Region II on February 25, May 11, and August 5, 1982. TVA's final report was submitted on September 8, 1982. During this inspection, discussions

were held with the licensee and corrective action examined to determine adequacy and completeness in accordance with the licensee's report. The inspector concluded that the licensee has determined the extent of the reported condition and performed the necessary survey and followup action to correct this condition.

(Closed) CDR 50-390/82-87 and 50-391/82-83, "Use of Fillet Welds on Piping Lugs". On August 19, 1982, TVA notified Region II of a potential 50.55(e) item. This was followed by TVA interim reports dated September 20, 1982, and January 19, 1983. TVA's final report was submitted to Region II on March 14, 1983. This deficiency dealt with fillet welds that had been used to attach lugs to piping at Watts Bar. These lugs were designed by either TVA or by vendors, and while the use of the fillet welded lugs is permitted by the ASME Code, TVA's Civil Engineering Support Branch (CEB) was concerned that TVA had no specific design document to qualify piping with fillet welded lugs. TVA's design document, CEB report 76-20, was being used even though it requires the use of full penetration welds. During this inspection, discussions were held with the licensee and corrective actions examined to determine adequacy and completeness in accordance with the licensee's report. The inspector concluded that the licensee has determined the extent of the reported condition and performed the necessary survey and followup action to correct this condition.

Within the areas examined, no violations or deviations were observed.

11. IE Bulletins - Units 1 and 2 (92703B)

(Closed) IE Bulletin 82-04, "Deficiencies in Primary Containment Electrical Penetration Assemblies". On January 24, 1983, TVA reported to Region II that TVA had not purchased or used any Bunker Ramo Company electrical penetration assemblies at any TVA nuclear plant holding an operating license or construction permit. The contents of Bulletin 82-04 was therefore, not applicable to Watts Bar Units 1 and 2 and this item was officially closed during the inspector's visit.

Within the areas examined, no violations or deviations were observed.