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

Report Nos.: 50-390/83-40 and 50-391/83-29

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

Inspectors: _____ 10/14/83
T. L. Heatherly Date Signed

_____ 10/14/83
W. B. Swan Date Signed

Approved by: _____ 10/14/83
for Caudle Julian, Section Chief Date Signed
Project Branch No. 1
Division of Project and Resident Programs

SUMMARY

Inspection on August 22 - September 21, 1983

Areas Inspected

This routine, announced inspection involved 180 resident inspector-hours on site in the areas of Licensee Action on Previous Enforcement Matters; Verification of As-Builts; Design, Design Bases and Modifications; Evaluation of Loss of Offsite Power Testing; Independent Inspection Effort; Review of Licensee Identified Items; Dams (Soil Liquefaction Barriers) Observation of Work.

Results

Of the seven areas inspected, no violations or deviations were identified in four areas; four apparent violations were found in three areas (Failure to establish and execute separation requirement inspection program, paragraph 5.a; failure to transcribe design basis requirements, paragraph 5.c; failure to establish adequate design review measures, paragraph 6; and failure to appropriately quantify acceptance criterion, paragraph 7).

REPORT DETAILS

1. Persons Contacted

   Licensee Employees

   *G. Wadewitz, Construction Project Manager
   *H. Fischer, Construction Engineer
   *S. Johnson, Quality Manager
   *W. Byrd, Compliance Supervisor, Power
   *T. Hayes, Nuclear Licensing Unit Supervisor
   *L. Kuehn, Preoperational Test Supervisor
   D. Williams, Nuclear Licensing Section Supervisor
   J. Wilder, Design Engineer
   O. Cingilli, Design Engineer
   E. Burke, Assistant Construction Engineer

   Other licensee employees contacted included 10 engineers.

   *Attended exit interview

2. Exit Interview

   The inspection scope and findings were summarized on September 16 and 21, 1983, with those persons indicated in paragraph 1 above.

3. Licensee Action on Previous Enforcement Matters

   a. (Closed) Violation (390/83-08-01): Failure to Control Work Processes. The violation identified the lack of quality assurance during work processes that allowed entry of foreign material into the secondary side of the steam generators.

      The licensee stated that previous construction work instructions did not include special provisions for inspection and cleaning low velocity areas and that recently issued procedures had been revised to reflect the need for those provisions.

      The exact cause and origin of foreign material was unknown (TVA or vendor) but since both parties could have been involved, the Unit 2 steam generators were also suspect. A 50.55(e) report was initiated for both units and will address the technical problems associated with the entrance of debris.

      To ensure better management controls over work on both the secondary and primary sides of the generators, Administrative Instruction (AI)-2.6 and Maintenance Instruction (MI)-68.9 were revised. Specifically, these instructions added steps to prevent foreign material entry by establishing material logs, personnel observation, QC holdpoints and requiring personnel to report the loss of material.

The inspector reviewed these procedures and determined that they were adequate. The inspector intermittently observed work activities associated with steam generator modifications and verified that cleanliness controls were being exercised. This item is closed.

b. (Closed) Open Item (82-09-01,82-07-01): Review of Plant Features for Accessiblity Requirements. This item identified that plant features may need to be modified to ensure that equipment is accessible for operation and maintenance and that "ALARA" factors have been considered. The item incorporated a previously identified concern relating to the Upper Head Injection (UHI) check valve design and installation. It appeared that two of the check valves were installed in a configuration such that future maintenance could not be performed.

To resolve the issue, the licensee has and will continue to conduct joint walkdowns throughout the plant to identify needed design changes. An NRC inspector witnessed the disassembly of one UHI check valve and noted that future maintenance requirements could be performed. The inspector reviewed developed procedures and the results of one system walkdown and found them to be adequately defined and implemented. This item is closed.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. The inspector performed a verification check of FSAR commitments versus the "As Built" plant. Results were as follows:

a. FSAR Section 7.1 states that the licensee will design and fabricate the main control room cabinet internal switches and cabling to specific separation criteria. During inspection of this equipment the inspector noted that construction management had not developed a QC program to ensure that separation criteria had been met. This problem was noted to be generic to the auxiliary control room cabinet work.

The inspector noted several deviations from approved separation requirements (See paragraph 5.b). This failure to establish and execute an inspection program to ensure that separation requirements had been met constitutes a violation (390/83-40-03). Prior to the end of the inspection period the inspector was informed that a draft QC procedure had been developed to ensure proper execution of this requirement.

b. The inspector conducted an inspection of the main control room electrical cabinets to ensure compliance with commitments made in Section 7.1 of the FSAR. Part of the inspection also included verifying that once equipment was installed, that the condition of the equipment stayed the same after maintenance activities.

c. Section 7.1.2.2.2, Part (4) of the FSAR states in part "... and in no case does cable from different trains touch or can it mitigate with time to touch". FSAR Figure 7.1-2, Note 7 states " .. install cable locking ties no more than 4 inches apart... to insure that the braid remains secure to the wiring...". Contrary to the above two requirements, five examples were noted where trains A and B cable were in contact. Those examples were as follows:

(1) 1-HS-67-152A cable in contact with EI-67-39A
(2) 0-HS-31-49A cable in contact with opposite train
(3) HS-31-3 and 4 cable in contact with each other
(4) HS-30-106 and 161 cable in contact with each other
(5) HS-31-12A cable in contact with cable for HS-30-157A

Sixty examples existed where cable ties were not placed at least every 4 inches to insure cable braid remained in place.

Further inspection revealed that approved drawings did not contain a sufficient amount of notes to ensure that commitments were met. Drawing 45W1640, the master of a series, contained appropriate instructions, however, subsequent drawings for each panel did not contain these notes nor did the drawings reference back to the master drawing. More importantly, further discussions with responsible management indicated that no specific procedural step existed to ensure that the design basis was transmitted to construction specifications and drawings. Numerous other examples have been identified by NRC and TVA that indicate that controls are not in place to preclude this problem. Some examples include:

(1) Failure to install a diesel generator blowout wall identified by NRC.

(2) Welding versus flanging primary system pressurizer relief valves identified by NRC.

(3) Failure to fabricate the RHR sump room in accordance with NRC design criteria (10 CFR 50, Appendix A), WBRD-390/82-42.

(4) Approximately 200 deviations from FSAR commitments (Chapters 7 and 8) as identified by TVA in an audit (10%) conducted at NRC's request. WBRD-390/81-20.

(5) Failure to meet Westinghouse separation criterion for installation of nuclear instrumentation cabling. WBRD-390/82-25.

(6) Deficient containment isolation valve signal and function. WBRD-390/81-98.

(7) Inadequacies in the FCR process which could have caused the high pressure fire protection system to be unable to carry out its function. WBRD-390/81-20.

(8) Examples of failure to meet FSAR commitments within the Auxiliary Feedwater System have recently been identified by an independent review group.

This failure to transcribe design basis requirements into construction specifications constitutes a violation (390/83-40-01, 391/83-29-01). As part of immediate corrective action, the licensee inspected and documented nonconformances on the items identified by the inspector.

6. Design, Design Bases and Modifications

The inspector conducted a review of one plant modification during the review period. During review of NCR WBN SWP 8101 the inspector identified that moving the main control room chlorine detector may have caused a substantial personnel hazard by rendering the detector inoperable due to its positioning in exhaust ductwork versus supply ductwork. In a subsequent report the licensee's report confirmed this matter. Discussion with design management (HVAC) indicated that field sketches were misread by all reviewers associated with the FCR and squad check process and subsequently the detector was installed improperly. This failure to establish adequate design review measures constitutes a violation (390/83-40-04).

7. Evaluation of Loss of Offsite Power Testing

During review of Preoperational Test TVA-13-B, "Onsite AC Distribution System (Diesel Generator Loading Logic)", the inspector identified that a safety-related change had been applied to areas beyond the scope of the change.

Change number seven to test TVA-13B was incorrectly developed to extend the maximum acceptable time for an emergency diesel generator to tie the emergency bus following a simultaneous blackout and safety injection signal from 10 seconds to 11.5 seconds. This change should have only been initiated, approved and issued to extend the blackout signal time delay. All personnel involved with the change's approval, including test personnel, safety committee and design personnel, failed to detect the incorrect specification of test signal. The change was made for all diesels. The failure to appropriately quantify acceptance criterion constitutes a violation (390/83-40-02).

A review of the completed official copy of test TVA-13B "Onsite AC Distribution System (Diesel Generator Loading Logic)" was conducted to assess administrative control and adherence. The inspector noted that four procedural steps had not been signed. However, it was apparent that the steps had been performed. Subsequent discussions with management revealed that increased controls had been developed since the performance of test TVA-13B to better identify these types of deficiencies; but a review had not been conducted for previously conducted tests to verify that actual steps had been performed. Until the licensee evaluates the need to review (in total or on sampling basis) tests conducted prior to management changes, this item is identified as an inspector followup item (390/83-40-05).

8. Independent Inspection Effort

a. On September 16, 1983, the inspector was briefed by the licensee concerning progress on the independent design review (Black and Veatch). Well into the review, TVA established an independent body (task force) to review and evaluate proposed corrective actions for all Black and Veatch (B&V) findings. The task force consisted of a multi-disciplined group and reported to a policy committee made up of high level managers including line managers, the Nuclear Safety Review Staff (NSRS) Manager, and the manager for Quality Assurance (QA).

The task force categorized the B&V findings (428) into 25 areas. Individuals members of the task force were held responsible for tracking the items to completion. Responses to the task force concerning corrective action were compiled and evaluated by the task force. Proposed corrective actions and differences between line personnel and the task force were reviewed by the policy committee for final resolution. The current status of all findings and documentation references were formally tracked by computer printout.

All findings, as they applied to the auxiliary feedwater system, were reviewed for generic applicability to other safety related systems and to other TVA plants. Corrective action schedules had been developed for Watts Bar and other sites. In a few cases, the inspector noted that TVA had taken additional steps for findings that B&V had not considered to be a problem. All previous commitments made by TVA appeared to have been met or exceeded. Present plans indicate that a meeting will occur between TVA and NRC to further discuss the review and corrective action to be taken.

b. On August 31, 1933, the senior resident inspector - construction attended a meeting on the preliminary findings of Phase II of the 79-14 Bulletin on Seismic Analysis for As-Built Safety-Related Piping Systems. ENDES Civil Engineering Branch (CEB) representatives reported that Teledyne Engineering Services (TES) representatives had been assigned to make measurements on the nine questionable areas identified by TVA Design and Construction during Phase I inspections. TES was given nine work packages consisting of isometric and physical drawings with acceptance criteria and specifications prepared by EN DES.

TES hao worked all nine packages and presented their data to CEB for analysis. CEB nad completed review of data for five work packages and expected to complete the final four by September 1, 1983. They estimated that TES's formal report and CEB's review findings would be available by September 21, 1983.

A tabulation of findings to date shows no significant findings. One Engineering Change Notice (ECN) had been prepared for the shimming of two supports.

TES had performed Phase II of BU 79-14 at the Sequoyah Plant and were familiar with requirements.

c. On Thursday, August 25, 1983, the senior resident inspector - construction, monitored the TVA Watts Bar biweekly progress overview conference. Eighteen categories of construction activities and concerns were discussed as to schedule status and current problems. Of particular concern to the inspectors was the status of preoperational tests and restraints on completion. TVA reported 47 tests in progress, to which there were restraints to 15, three for fire damper modifications and four awaiting removal of the reactor head. During consideration of the open work items list (OWIL), the inspector discussed coordination of NRC and TVA units on closure of Construction Deficiency Reports (CDRs), violations, unresolved items and inspector follow-up items. NRC was delinquent in closing some thirty items for which TVA had supplied information folders for NRC consideration for closure.

9. Dams (Soil Liquefaction Barriers) Observation of Work

a. Four inspection tours were made by the resident inspector of compaction of backfill clay in the excavation to the east of the Intake Pumping Station (IPS) and of excavation, down to shale, west and northwesterly of the IPS for additional stabilization barriers. No violation or deviation was identified in the soil compaction work; and the excavation is not quality assurance controlled.

On Saturday, September 17, the senior resident inspector - construction found that during excavation the four-foot diameter corrugated metal casing over the three-foot diameter fiberglass effluent line from the cooling towers had been ruptured. Water from leakage or a break elsewhere in the effluent line was pouring into the excavation and flowing through a cut in the side slope of the intake channel near the pump station. Muddy water was flowing into the channel.

On Monday, September 19, the inspector found that the licensee had installed a crushed rock weir at the channel wall notch and that only clear waste water was washing into the intake channel. The licensee was excavating along the cased effluent line to find and plug the line break. The licensee has requested an inspection by TVA's environmental group to determine any detrimental impact from the muddy water which flowed into the channel on Saturday, September 17. No safety related impact has been determined at this writing. The inspector will monitor continuing activities and findings.

10. Followup on Licensee Identified Items

a. (Open) LII (NCR WBN SWP 8101): Main Control Room Habitability. This report discussed the potential for significant air leakage and subsequent high levels of radiation inside the main control room as a result of inadequate HVAC design.

The report was evaluated previously by a visiting inspector and found to be inadequate. The inspector identified three mis-statements, a potential safety hazard and apparent mishandling of ECNs.

On September 6, 1983, the licensee submitted its third revised final report. The three mis-statements were clarified. The apparent safety hazard was substantiated and is discussed in paragraph 6. The mishandling of ECNs has previously been identified by TVA and corrective actions taken. Corrective actions and the safety significance of mishandling the ECNs noted in this report were not assessed by the inspector prior to the end of the reporting period. However, it appears that corrective actions previously taken by TVA to identify and correct root causes has been inadequate. This item will remain open pending further review.

b. (Closed) LII (CDR 390/82-112; CDR 391/82-105): Fins and Heads on Star Model QE Sprinkler Heads - WBRD-390/82-112 and WBRD-50-391/82-105.

The licensee reported the subject item on October 26, 1982, after notification by Factory Mutual Research Corporation (FMC) of two problems associated with these sprinkler heads: possible inoperability from bending of the heat collecting fins and corrosion of the center strut at the contacts with the fins. FMC recommended replacement by a different type. TVA then issued a contract to FMC to make a performance test simulating TVA conditions.

FMC's test report indicates that "The subject sprinklers would have responded promptly to a fire". This conclusion was based on two observations. First, the fins and struts are of similar copper composition, thus minimizing the possibility of an electrolytic reaction between these components. Secondly, the sprinkler heads functioned properly during the test except when the fins were wrapped around the head's support arms. TVA feels that it is not possible for the fins to be bent into this configuration except through deliberate vandalism. Since no sprinkler heads can be designed against such deliberate acts, head replacement is considered to be unnecessary.

Consequently, since the sprinkler heads are to be used "as is", no nonconforming condition exists and therefore, no condition adverse to safety exists. Therefore, TVA no longer considers this condition reportable under the provisions of 10 CFR 50.55(e).

The senior resident believes TVA's course and conclusion were sound. This item is closed.

c. (Closed) LII (CDR 390/81-59; CDR 391/81-55): Rock Supported Structures Differential Settlement - WBRD-50-390/81-59; WBRD-50-391/81-55.

On July 7, 1981, TVA identified a 10 CFR 50.55(e) concern that differential settlements of rock supported structures could present an operational safety problem from rupture of support systems, especially during a design base event.

The licensee's final report dated September 16, 1983, described the analyses leading to the determination that, (1) critical support systems can withstand a 1-inch differential settlement of adjacent structures; (2) the differential settlement will be less than 1/2-inch; and (3) no significant additional settlement will occur. The resulting conclusion was that there is no adverse safety system concern from differential settlement.

The resident has reviewed the reports, is familiar with the layout of the structures, has inspected construction throughout its progress, and concurs with the licensee's conclusion.

This item is closed.

(Closed) LII (CDR 390/82-110; CDR 391/82-103): Valve Verification Program WBRD-50-390/82-110, WBRD-50-391/82-103; NCR WBN NEB 8218.

On October 19, 1982, the licensee notified NRC of a 50.55(e) concern with verification testing of valves, in that the tests had not been performed and were not included in the plant's preoperational test instructions.

By Final Report dated August 12, 1983, the licensee asked that this item be deleted as a 10 CFR 50.55(e) item since they no longer consider the condition to be adverse to safe operation of the plant.

The licensee stated that: "Further investigation of the preop program and consideration of vendor testing and inservice inspection testing as described in more detail below shows that adequate testing for active valves in the TVA scope of supply is being performed.

Based on the preop and inservice testing described above, the post installation testing is judged to be adequate. There are, therefore, no safety implications involved with this NCR and TVA no longer considers this item reportable under 10 CFR 50.55(e)."

The inspector reviewed the documentation and concurs in the deletion.

This item is closed.