

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos: 50-390, 50-391
License Nos: NPF-90 and Construction Permit CPPR-92

Report Nos: 50-390/99-09, 50-391/99-09

Licensee: Tennessee Valley Authority

Facility: Watts Bar, Units 1 and 2

Location: 1260 Nuclear Plant Road
Spring City TN 37381

Dates: September 26 through November 6, 1999

Inspectors: P. Van Doorn, Senior Resident Inspector
D. Rich, Resident Inspector
R. Telson, Resident Inspector, Sequoyah Nuclear Plant
(Section E2.1)

Approved by: P. E. Fredrickson, Chief
Reactor Projects Branch 6
Division of Reactor Projects

Enclosure

EXECUTIVE SUMMARY

Watts Bar, Units 1 and 2
NRC Inspection Report 50-390/99-09, 50-391/99-09

This integrated inspection included aspects of licensee operations, maintenance, engineering, and plant support. The report covers a six-week period of resident inspection and a Year 2000 readiness inspection.

Operations

- The conduct of Operations was professional and generally safety-conscious. Requirements were met for control room conduct and other areas reviewed such as turnovers, tagouts, documentation, staffing, and assistant unit operator activities. Control room briefs were thorough and emphasized safety (Section O1.1).
- Housekeeping and material condition were good, in that: loose debris was not noted; leaks were minimal, and no uncontrolled leaks were noted; no significant material damage was noted; temporarily stored material met requirements; and transient combustibles met requirements (Section O1.1).
- A detailed engineered safety feature system walkdown of portions of the diesel generator (DG) system identified system lineup, material condition, and housekeeping to be acceptable (Section O2.1).
- The licensee removed two of four air receivers from service for maintenance on the 1A-A DG and considered the DG operational. This was a non-conservative decision because the licensee could not justify the action without substantial research when questioned by the NRC. Subsequently, the licensee demonstrated that the 1A-A DG remained operable with the remaining air receivers that were in service. (Section O4.1).
- Operators exhibited good situational awareness in response to loss of several control functions. For example, operators recognized that pressurizer spray valves were full open and took prompt corrective action, preventing a possible reactor trip (Section O4.2).
- The Management Review Committee (MRC) exhibited a questioning attitude regarding corrective action plans and adequacy of immediate corrective actions for problems associated with problem evaluation report (PER) initiations. Corrective action plans were typically thorough, with occasional exceptions recognized by the MRC members. The licensee demonstrated a low threshold for initiation of PERs. The areas being reviewed by Nuclear Assurance were appropriate, based on performance, and several beneficial findings were noted (Section O7.1).

Maintenance

- Ten maintenance and surveillance activities were adequately performed. Maintenance personnel were knowledgeable and carefully followed procedures to resolve plant equipment and component problems. Work performed was typically well documented (Section M1.1).

Engineering

- Reviewed engineering activities were thorough and technically viable. Plant equipment problems were being addressed commensurate with plant safety. Engineering personnel appropriately designated the hydrogen ignitor system as an "a (1)" system in accordance with the Maintenance Rule after evaluating an additional hydrogen ignitor system failure (Section E1.1).
- The licensee's use of containment penetrations during maintenance periods was justified by a thorough safety assessment/safety evaluation (SA/SE). The SA/SE and a work document from the most recent refueling outage documented completion of required tests and compliance with Technical Specifications. However, one reviewed procedure was weak in that it did not require shift manager notification and TS limiting condition of operations entry in case of loss of temporary system integrity (Section E1.2).
- The inspector determined the certification documentation and operation of the Health Physics Information Management System, the Nuclear Operations Management System, and the Security Check-In Process Software to have adequately demonstrated Year 2000 (Y2K) compliance (Section E2.1).

Plant Support

- Radiological controls were adequate. Radiological areas were properly posted and high radiation areas were labeled and locked. Personnel were attentive and followed requirements. Thorough radiological briefs were noted. The licensee provided thorough oversight of chemistry results and limits reviewed were met (Section R1.1).
- Chemistry personnel demonstrated a low threshold for use of PERs to evaluate chemistry trends (Section R7.1).
- During an emergency drill, licensee personnel demonstrated good teamwork and developed well thought-out strategies to combat a very challenging scenario. Priorities were appropriately assigned. Emergency classifications were in accordance with procedures and timely. Some examples of incomplete communications were noted; however, these were appropriately identified during the critique by licensee personnel (Section P5.1).
- Security personnel were attentive and followed requirements for access control. Problems were not identified with barriers and zones (Section S1.1).

Report Details

Summary of Plant Status

Unit 1 began the inspection period operating in Mode 1 at 100 percent reactor power and remained at essentially 100 percent for the duration of the inspection period.

Unit 2 remained in a suspended construction status.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

The inspectors conducted frequent plant tours and reviews of ongoing plant operations. This included observation of routine control room (CR) crew activities and turnovers; review of logs, standing and night orders, CR staffing, and tagouts; and observation of assistant unit operator (AUO) activities.

The conduct of Operations was professional and generally safety-conscious. An exception is described in Section 04.1. Requirements were met for CR conduct and other areas reviewed such as turnovers, tagouts, documentation, staffing, and AUO activities. CR briefs were thorough and emphasized safety. During routine tours, inspectors noted that housekeeping and material condition were good, in that: loose debris was not noted; leaks were minimal, and no uncontrolled leaks were noted; no significant material damage was noted; temporarily stored material met requirements; and transient combustibles met requirements.

O2 Operational Status of Facilities and Equipment

O2.1 Engineering Safety Feature System Walkdown (71707)

The inspector performed a detailed engineered safety feature systems walkdown of portions of the diesel generator (DG) systems. The inspector reviewed resolution of recent problem evaluation reports (PERs), implementation of recent design changes, and compared system lineup to design documentation including the system description, N3-82-4002, and the Updated Final Safety Analysis Report (UFSAR). The DG system description stated that the essential raw cooling water (ERCW) supply valve to each DG opens on receipt of a start signal. The ERCW supply valve to the DG actually remains open in standby, with constant ERCW flow through the DG coolers. This lineup was changed prior to initial plant startup and was documented in the ERCW system description and drawings. The licensee documented this discrepancy on PER 99-14339-000. No other problems were identified. System lineup, material condition, and housekeeping were acceptable in all cases. No substantive concerns were identified as a result of this walkdown.

O4 Operator Knowledge and Performance

O4.1 Diesel Generator Air Start System Maintenance

a. Inspection Scope (71707)

The inspector reviewed the basis for operability determination of the DGs with various air start system components removed from service.

b. Observations and Findings

The DG units are tandem-engine/single-generator units. The air start system consists of two air receivers on each engine, (four on each DG unit), and two pairs of air start motors for each engine, (four pairs for each DG unit). On November 1, the licensee simultaneously removed one air receiver on each engine of the 1A DG unit from service. One pair of air start motors was also removed from service. The licensee still considered the DG unit operable in this condition but was not able to justify the decision when questioned by the inspector. The DG system description, N3-82-4002, did not specify how many air receivers were required for operability. Surveillance Instruction O-SI-82-11-A, Monthly DG Start and Load Test DG 1A-A, Revision 8, required air receiver pressure to be greater than or equal to 200 psig but did not specify how many air receivers must be available. The design basis for the DG air start system, as stated in the TS 3.8.3 bases, requires an air start system with adequate capacity for five successive start attempts without recharging the air receivers. After researching pre-operation tests, the licensee found that Preoperational Test Instruction TVA-14B, Diesel Generator Starting Air System, Revision RO, conducted on September 29, 1982, documented that with one air receiver removed from service on each engine, the air start system performed five start attempts, starting the DG unit on the fifth attempt. Therefore, the design basis was met with one air receiver in service on each engine.

c. Conclusions

The licensee removed two of four air receivers from service for maintenance on the 1A-A DG and considered the DG operational. This was a non-conservative decision because the licensee could not justify the action without substantial research subsequent to NRC questioning. The inspector concluded that with the remaining air receivers the 1A-A DG remained operable during the maintenance activity.

O4.2 Loss of R-1 Reactor Controls Panel

On November 4, 1999, the licensee experienced a failure in reactor protection panel 1-R-1. The failure occurred due to a loss of circuit card number 1-DPF-099-0113 which was sent to the vendor (Westinghouse) for failure analysis. The inspector reviewed operator actions taken for loss of some control functions due to loss of the 1-R-1 control panel. Operators exhibited good situational awareness in response to loss of the panel. Operators recognized that pressurizer spray valves were full open and took prompt corrective action, preventing a possible reactor trip.

O7 Quality Assurance In Operations

O7.1 Licensee Self-Assessment Activities (40500)

The inspectors reviewed various self-assessment activities which included the following:

- Observation of Management Review Committee (MRC) meetings;
- Review of selected PERs for adequacy of corrective actions and implementation of procedural requirements;
- Review of PER initiations; and
- Review of Nuclear Assurance (NA) activities and findings.

The MRC exhibited a questioning attitude regarding corrective action plans and adequacy of immediate corrective actions for problems associated with PER initiations. Corrective action plans were typically thorough, with occasional exceptions recognized by the MRC members. The licensee demonstrated a low threshold for initiation of PERs. The areas being reviewed by NA were appropriate, based on performance, and several beneficial findings were noted.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope (62707)

The inspectors observed pre-planned and emergent maintenance activities including all or portions of the following work orders (WOs) and surveillance instructions (SIs) and reviewed associated documentation:

- WO 99-013075-000, Limitorque Operator Periodic Maintenance, 1-FCV-74-24, 1-B-B RHR Pump Mini Flow Valve
- WO 99-011536-000, Periodic Calibration of 1-TS-030-0180, 1A-A SI Pump Room Temperature
- WO 99-009192-002, Rebuild Inboard and Outboard Centrifugal Charging Pump Spare Mechanical Seals
- WO 99-007475-000, MOVATS, 1-FCV-63-156
- WO 99-007535-000, 1A-A SI Pump Oil Cooler Inspection per PMUG 7916V

- WO 99-010302-000, Main Control Room Chiller B-B Inspection, in accordance with MPM 2766 FWM 2766F
- WO 98-010936-001, Weld Repair Motor Base Mount on Main Control Room Air Handling Unit B-B
- WO 99-011928-000, IMI-68.011, Delta T/Tavg and TTD Channels Tuning Constants Adjustments, Revision 5
- 1-SI-85-2, Reactivity Control Systems Movable Control Assemblies (Modes 1 and 2), Revision 3
- 0-SI-82-12B, Monthly Diesel Generator Start and Load Test DG 2B-B (fast start), Revision 7

b. Observations and Findings

The inspectors observed the activities identified above and determined that personnel involved in the work were qualified and knowledgeable in the tasks being performed. The work instructions were observed being followed, and problems, if encountered during the performance of the work, were properly dispositioned. Work performed was also typically well-documented. Where appropriate, radiation control measures were in place.

c. Conclusions

Ten maintenance and surveillance activities were adequately performed. Maintenance personnel were knowledgeable and carefully followed procedures to resolve plant equipment and component problems. Work performed was typically well-documented.

III. Engineering

E1 Conduct of Engineering

E1.1 General Observations (37551)

The inspectors observed Engineering support activities for emergent issues, PER evaluations, review of plant equipment problems and associated corrective action plans, and MRC meetings. Emergent problems included an evaluation of an additional hydrogen ignitor failure. The licensee had experienced previous failures with the hydrogen ignitors which were documented in IR 50-390, 391/99-07, Section E2.1.

Reviewed engineering activities were thorough and technically viable. Plant equipment problems were being addressed commensurate with plant safety. Engineering personnel appropriately designated the hydrogen ignitor system as an "a (1)" system in accordance with the Maintenance Rule.

E1.2 Use of Containment Penetrations During Maintenance Periods

a. Inspection Scope (37551)

The inspector reviewed testing requirements and procedural controls for use of containment penetrations during maintenance periods.

b. Observations and Findings

The inspector reviewed the licensee's use of containment penetrations during maintenance periods and reviewed safety assessment/safety evaluation (SA/SE) WBOTSS-97-241-1. The inspector found that the SA/SE thoroughly addressed compliance with Technical Specifications (TS), including a detailed description of the types of temporary systems which could be installed in the penetrations and required actions to be taken in case of a fuel handling accident or other event. The inspector found that, for one activity, the implementing instruction, MI 88.003, Opening Primary Containment Penetrations and Shield Building Penetrations for Maintenance Activities, Revision 3, was weak in that it did not contain instructions to notify the shift manager in the case of a loss of temporary system integrity, which would require TS limiting condition of operation (LCO) entry and cessation of any core alteration activities in progress. The licensee agreed an enhancement to this procedure was warranted and documented the issue in PER 99-014590-000. The inspector reviewed WO 98-002444-000, Open, Close as required, Shield Building Penetration MK-72 and Containment Penetrations, X-54, X-117, X-118, X-108, and X-109 to Support Moisture Carry Over, Sludge Lancing, Eddy Current and Any Other Requirement (for refueling outage number two). The inspector found that WO 98-002444-000 documented operations and required tests on the various penetrations and identified no deficiencies.

c. Conclusions

The licensee's use of containment penetrations during maintenance periods was justified by a thorough SA/SE. The SA/SE and a work document from the most recent refueling outage documented completion of required tests and compliance with TS. However, one reviewed procedure was weak in that it did not require shift manager notification and TS LCO entry in case of loss of temporary system integrity.

E2 **Engineering Support of Facilities and Equipment**

E2.1 Year 2000 (Y2K) Readiness Program Review (2515/141)

By letter dated September 20, 1999, TVA notified the NRC that the remaining Y2K open items had been closed for all TVA nuclear sites. On October 20, 1999, the inspector reviewed the licensee's Y2K certification documentation and physically observed operation of the three closed items in accordance with applicable portions of Temporary Instruction (TI) 2515/141, "Review of Year 2000 (Y2K) Readiness of Computer Systems at Nuclear Power Plants."

The inspector determined the certification documentation and operation of the three systems, listed below, to have adequately demonstrated Y2K compliance.

- Health Physics Information Management System (HIS-20)
- Nuclear Operations Management System (NOMS)
- Security Check-In Process Software (CHIPS)

IV. Plant Support

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 General Comments (71750)

The inspectors routinely observed radiologically controlled areas to verify adequacy of access controls, locked areas, personnel monitoring, surveys, postings, and radiological briefings. The inspectors also routinely reviewed primary and secondary chemistry results.

Radiological controls were adequate. Radiological areas were properly posted and high radiation areas were labeled and locked. Personnel were attentive and followed requirements. Thorough radiological briefs were noted. The licensee provided thorough oversight of chemistry results and limits reviewed were met.

R7 Quality Assurance in RP&C Activities

R7.1 Review of Problem Evaluation Reports (40500)

The inspector reviewed PER initiations in the chemistry area. Two PERs were initiated for differences noted by Chemistry personnel. One involved the fact that more chemicals had to be added to maintain chemistry parameters in the B component cooling heat exchanger than in the A and C heat exchangers. The other PER documented a slight difference in chemistry of one steam generator versus the other three. This was considered a good use of PERs and demonstrated a low threshold by chemistry personnel for use of PERs to evaluate chemistry trends.

P5 Staff Training and Qualification in EP

P5.1 Emergency Drill Observation (71750)

The inspector observed a radiological emergency plan drill from the technical support center (TSC). Licensee personnel demonstrated good teamwork and developed well thought-out strategies to combat a very challenging scenario. Priorities were appropriately assigned. Emergency classifications were in accordance with procedures and timely. Some examples of incomplete communications were noted; however, these issues were appropriately identified during the critique by TSC personnel.

S1 Conduct of Security and Safeguards Activities**S1.1 General Observations (71750)**

The inspectors routinely observed security activities for conformance to requirements which included protected area barriers, isolation zones, personnel access, and package inspections. Security personnel were attentive and followed requirements for access control. Problems were not identified with barriers and zones.

V. Management Meetings**X1 Exit Meeting Summary**

The resident inspectors presented inspection findings and results to licensee management on November 15, 1999. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED**Licensee**

R. Beecken, Maintenance and Modifications Manager
 D. Boone, Radiological Control Manager
 L. Bryant, Assistant Plant Manager
 J. Cox, Training Manager
 D. Kulisek, Operations Manager
 W. Lagergren, Plant Manager
 D. Nelson, Business and Work Performance Manager
 P. Pace, Licensing and Industry Affairs Manager
 R. Purcell, Site Vice President
 J. Roden, Operations Training Manager
 S. Spencer, Site Nuclear Assurance Manager
 T. Wallace, Operations Superintendent
 G. Vickery, Chemistry Manager
 J. West, Assistant Plant Manager

NRC

P. Van Doorn, Senior Resident Inspector
 D. Rich, Resident Inspector

INSPECTION PROCEDURES USED

- IP 37551: Onsite Engineering
- IP 40500: Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
- IP 62707: Maintenance Observation
- IP 71707: Plant Operations
- IP 71750: Plant Support Activities
- TI 2515/141: Review of Year 2000 (Y2K) Readiness of Computer Systems at Nuclear Power Plants