



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

Report No.: 50-328/84-39

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

Docket No.: 50-328

License No.: DPR-79

Facility Name: Sequoyah Unit 2

Inspection Conducted: December 17-20, 1984

Inspector: J. L. Mathis 1/29/85
J. L. Mathis Date Signed

Approved by: F. Jape 25 Jan 85
F. Jape, Section Chief Date Signed
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This routine, unannounced inspection involved 37 inspector-hours on site in the areas of start-up testing following refueling, control rod worth measurement, isothermal temperature coefficient and zero power test witnessing.

Results: No violations or deviations were identified.

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REPORT DETAILS

1. Licensee Employees Contacted

- *L. M. Nobles, Superintendent of Operations and Engineering
- *R. E. Alsop, Compliance Supervisor
- *R. W. Fortenberry, Engineering Supervisor
- *G. W. Gault, Reactor Engineering Supervisor
- *W. L. Williams, Chemical Unit Supervisor
- *D. E. Crawley, Health Physics Supervisor
- *C. R. Brimer, Site Services Manager
- *D. C. Craven, Quality Assurance Staff Supervisor
- B. Schofield, Test Engineer
- B. Buns, Foreman Mechanical
- G. Tiner, Instrument Engineer
- R. Cooley, Electrical Maintenance

Other licensee employees contacted included technicians, operators, mechanics, security force members, and office personnel.

NRC Resident Inspectors

- *E. Ford
- *L. Watson

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on December 20, 1984, with those persons indicated in paragraph 1 above. The following inspector follow-up item was discussed. The licensee acknowledged the inspection findings without significant comment.

328/84-39-01, Procedural discrepancies, Paragraph 5c.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Startup Testing - Refueling (72700)

The inspector reviewed GOI-2, Plant Startup From Hot Standby to Minimum Load, for Unit 2, cycle 3. GOI-2 provided the prerequisites, precautions, and step-by-step instructions for the Unit startup from hot standby (Mode 3)

to minimum load (Mode 1). The inspector witnessed and reviewed the following tests associated with startup-testing following the refueling outage:

- RTI-1, Restart Sequence
- RTI-3, Initial Criticality
- RTI-4, Boron Endpoint Determination and Isothermal Temperature Coefficient Measurement
- RTI-5, Rod Bank Worth Measurement using Dilution/Boration Method
- RTI-7, Rod Worth Measurement Using Rod Swap
- SI-43, Rod Drop Time Measurement
- SI-93, Reactor Trip Instrumentation Functional Tests

The inspector reviewed the above procedures to assure that crew members were using the procedure with proper revision number and were familiar with the procedural requirements, especially the limitations and precautions. During the review process the inspector verified the following:

- The acceptance criteria were stated in the test procedure and all necessary raw data were collected, assembled, and transferred to the person(s) performing the final analysis.
- The inspector verified that procedural prerequisites and initial conditions had been met. Verification consisted of the inspector's review of the required records (valve lineup list, instrumentation calibration procedure, system checklist, or sign-off item in the listed procedure) or by direct observation (monitoring instrumentation indications, valve positions, equipment start position switches or personnel actions).

The following tests were reviewed and witnessed by the inspector:

a. Restart Sequence (RTI-1)

Restart Sequence provided the recommended sequence of events that make-up the plant restart testing program. It included a tabulation of the major phases of the restart test program, a tabulated summary of Restart Test Instructions (RTIs) and applicable plant instructions to be performed, and acceptance and review criteria for each instruction.

b. Rod-Drop Time Measurement (SI-43)

The inspector witnessed SI-43, Rod Drop Time Measurement, which verified that all rod drop times for full length rods are within the Technical Specification (TS) limits following each removal of the reactor vessel head prior to reactor criticality.

During the rod drop test, the licensee encountered a problem with control rod N-11. Maintenance Request (MR) No. 297847 was written to repair a depress pin located down in the male portion of the Control

Rod Drive Mechanism (CRDM) plug. After the pin was pulled up and locked in place, retesting of the effected rod was performed; it then satisfied the TS requirements of 2.2 seconds.

c. Initial Criticality (RTI-3)

The initial criticality test provided the instructions for taking the reactor critical for the first time following a refueling outage. It established the upper limit of neutron flux level for all zero power physics requirements, which defines the range of flux levels over which the zero power kinetics testing will be done, and verified proper operation of the reactivity computer.

During the performance of RTI-3, the inspector noted the following minor discrepancies:

- (1) Data Sheet 3 of RTI-3 did not include the time the reactor went critical, nor was there a signature for the reviewer acknowledging that the procedure had been reviewed.
- (2) Step 5.2 required that the licensee plot Inverse Count Rate Ratio (ICRR) vs. rod height. This graph did not include the preparer's signature as required by the procedure.

Discussions with management about the above discrepancies during the exit meeting on December 20, 1984, concluded that, although minor discrepancies existed, the problems will be corrected and would have been caught during review of the test data packages. The licensee corrections will be reviewed in a future inspection. This issue will be tracked as an inspector follow-up item (328/84-39-01).

d. Rod Bank Worth Measurement Using Dilution/Boration Method (RTI-5)

The licensee determined the integral and differential worth during zero power physics testing of only the reference bank. This was accomplished by setting up a dilution/boration rate and compensating for the positive/negative insertion by inserting/withdrawing the controlling Rod Cluster Control (RCC) bank. The reactivity changes were then measured by the reactivity computer.

e. Rod Worth Measurements Using Rod Swap (RTI-7)

The licensee determined RCC worths by inserting a RCC bank and compensating for the reactivity change by withdrawing the reference bank. The reference bank and bank D integral and differential worth were determined by RTI-5. The worths of the remaining RCC banks were determined by rod swap.

At 1735 while moving control bank A from 186 step to 206 step, control rod H-10 Rod Position Indicator (RPI) dropped 90 steps. At the same time, reactivity as seen by reactivity-computer and count-rate on N35/36

was observed to drop rapidly. At the time of the rod drop incident, the step counter for rod indication showed the following:

- Control Bank A - Step 206 (Group 2)
- Control Bank B - Step 228
- Control Bank C - Step 0
- Control Bank D - Step 152

Within one hour of the drop rod H-10, the licensee had initiated calculation for shut-down margin to determine whether the margin was greater than or equal to 1.6% WK/K for 4-loop operation as required by Limiting Condition for Operation (LCO) 3.1.1.1. The inspector reviewed the surveillance instruction which the licensee use to determine whether shutdown margin was greater than or equal to 1.6 WK/K.

At 1345 the electrician had completed the work on the control rod drive mechanism and was able to withdraw H-10. The licensee had written MR 301075 to repair the depressed pin on the CRDM connection for H-10.

f. Boron Endpoint Determination and Isothermal Temperature Coefficient Measurement (RTI-4)

The licensee determined the endpoint boron concentration at various control rod configurations and determined the isothermal temperature coefficient at various rod configurations.

The endpoint was determined by measuring the just critical boron concentration in the RCS and then withdrawing/inserting the controlling bank to its fully withdrawn/insertion position. The reactivity increase/decrease was observed on the reactivity computer and multiplied by the inverse differential worth of boron to determine the change required in the just critical boron concentration to obtain the endpoint boron concentration. The inspector verified that the endpoint was within the acceptance criteria specified in RTI-1.

g. Reactor Trip Instrumentation Functional Tests (SI-93)

The inspector witnessed these pre-startup Functional Tests of reactor trip instrumentation. The tests covered requirements for pre-startup functional test surveillance required by the Standard Technical Specifications. These tests are necessary in order to declare the systems operable.

In the areas inspected, no violations or deviations were identified.