



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

Report Nos.: 50-327/85-44 and 50-328/85-44

Licensee: Tennessee Valley Authority
6N11 B Missionary Ridge Place
1101 Market Street
Chattanooga, TN 37402-2801

Docket Nos.: 50-327 and 50-328

License Nos.: DPR-77 and DPR-79

Facility Name: Sequoyah 1 and 2

Inspection Conducted: November 29 - December 6, 1985

Inspector: H. L. Whitener 1/8/86
H. L. Whitener Date Signed

Accompanying Personnel: C. Petrache, Philippine Atomic Energy Commission

Approved by: Frank Jape 1/8/86
F. Jape, Section Chief Date Signed
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This routine, announced inspection entailed 67 inspector-hours on site in the areas of witnessing the integrated leak rate test, reviewing local leak rate test results, and reviewing outstanding items.

Results: No violations or deviations were identified.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *H. L. Abercrombie, Site Director
- *P. R. Wallace, Plant Manager
- *J. A. McPherson, Engineering and Test Unit Supervisor
 - R. Mooney, Systems Engineering
- *G. B. Kirk, Compliance Supervisor
 - M. Harding, Engineering Group Supervisor
- *M. E. Chattin, Engineering and Test Mechanical Engineer
- *K. H. Clark, Containment Test Supervisor
- *L. Farmer, CILRT Director
 - C. Miller, CILRT Coordinator
- *J. Denny, Containment Test Group
 - G. Morris, Containment Test Group
 - F. Walker, Associate Engineer

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

NRC Resident Inspectors

- *K. Jenison
- *L. Watson

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on December 6, 1985, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee. The Unit 1 CILRT was successfully completed December 5, 1985 (paragraph 5).

Two new inspector followup items (IFI) were identified as follows:

IFI (50-327/85-44-01): Review recalibration of Mensor pressure gauges and verify acceptable leak rate. (Paragraph 5.a)

IFI (50-327/85-44-02): Review actions to prevent inadvertent changes to proceures and verify that no changes occurred in SI 156 which effect the test results. (Paragraph 5.b)

The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

3. Licensee Action on Previous Enforcement Matters (92702)

(Closed) Violation (50-328/84-36-01) concerned inadequate implementation of fuel handling instructions (FHI-7) which resulted in damage to a rod control cluster in that clearance was not available when the fuel assembly conveyor was raised on the reactor side.

In addition to correcting equipment problems (IE Report 50-328/84-36), the licensee has specified in fuel handling instructions FHI-3 and FHI-7 that all interlocks are to be checked out and functional. Also, if it is necessary to bypass an interlock, the procedure requires approval by the refueling SRO and clear documentation of the event. Further, prior to raising the upender, the licensee's instruction requires visual verification that the fuel assembly and any inserts will clear the transfer tube flange. The verification is done by means of an underwater TV system. The violation is considered closed.

4. Unresolved Items

Unresolved items were not identified during the inspection.

5. Containment Integrated Leak Rate Test - (61719) (Unit 1)

The inspector reviewed and witnessed test activities to determine that the primary containment integrated leak rate test was performed in accordance with the requirements of Appendix J to 10 CFR 50, ANSI 45.4 and the test procedure SI-156, "Containment Integrated Leak Rate Test."

Selected sampling of the licensee's activities which were inspected included: (1) review of the test procedure to verify that the procedure was properly approved and conformed with the regulatory requirements; (2) observation of test performance to determine that test prerequisites were completed, special equipment was installed, instrumentation was calibrated, and appropriate data recorded; and (3) preliminary evaluation of leakage rate test results to verify that leak rate limits were met.

Pertinent aspects are discussed in the following paragraphs.

a. General Observations

The inspector witnessed and reviewed portions of the test preparation, containment pressurization, temperature stabilization and data processing during the period of November 29 - December 5, 1985. The following items were verified:

- (1) The test was conducted in accordance with a approved procedure. Procedure changes and test discrepancies were properly documented in the procedure.
- (2) Test prerequisites selected for review were found to be completed.

- (3) Plant systems required to maintain test control were reviewed and found to be operational.
- (4) Special test instrumentation was reviewed and found to be installed and calibrated.
- (5) Data required for the performance of the containment leak rate calculations were recorded at 10-minute intervals.
- (6) Problems encountered during the test were described in the test event log.
- (7) Procedure valve alignment was reviewed against system drawings to verify correct boundary alignment, and venting and draining of specific systems.

No problems were identified in the above review with the exception of items (1) and (4). A discrepancy in the test procedure (item 1) is discussed in paragraph 5.b below. The discrepancy in calibrations (item 4) was identified in the final instrument check outs prior to starting the stabilization phase of the test. The licensee determined that the outputs from two Mensor precision pressure gauges monitoring the same pressure source were significantly different. Review of the current calibration data with data from previous calibrations showed a change of about 1% had occurred in gauges which are accurate to 0.015% of reading. When the Mensor calibration performed for the November 1984 test on Unit 2 was used, the gauges yielded consistent readings while monitoring the same pressure source. Based on the above information, the licensee decided to use the previous instrument calibration for the CILRT on Unit 1 with the qualification that immediately after the test the pressure gauges will be recalibrated and the leak rate recalculated using this recalibration data. At the exit interview, management agreed to verify leak rate acceptability based on corrected calibration data prior to plant startup. The inspector identified this matter for followup inspection as:

IFI (50-327/85-44-01): Verify that the Mensor pressure gauges were recalibrated, the CILRT results were recalculated using the corrected calibration data, and the containment leak rate verified to be acceptable prior to requiring containment integrity.

b. Test Procedure Review - Units 1 and 2

The inspector reviewed portions of SI-156, Revision 8, and found that, in general, adequate test controls, acceptance criteria and valve alignments were specified. However, one problem occurred while implementing plant equipment instruction step 6.4.2. Step 6.4.2 requires that the solid state protection system (SSPS) be removed from service to preclude actuation of certain engineered safety systems by

high containment pressure. There are two switches which can be used to defeat the actuation of the engineered safety features: the input error inhibit switch and the mode selector switch. During preoperational testing, the CILRT procedure required placing the input error inhibit switch in the inhibit position. It was recognized that in this position the switch caused a loss of detector voltage to the neutron source range detectors as well as blocking ESF actuation signals. Prior to using procedure SI-156 for the first periodic CILRT, step 6.4.2 was revised to require placing the mode selector switch in test position. In this manner, output signals from the SSPS to actuate certain ESF equipment are blocked without effecting the neutron source range detector voltage. In SI-156, Revision 7, step 6.4.2 again required the use of the input error inhibit switch. As a result, when the input switch was placed in the inhibit position for both Trains A and B logic, the detector voltage was lost for both neutron source ranges N31 and N32.

Loss of the source range detectors was observed immediately by operations personnel and the action statement which require monitoring the shutdown margin every six hours was entered at 3:55 a.m. on December 1, 1985. The input switches were repositioned to normal and the LCO was complied with at 3:56 a.m. (elapsed time of one minute) by returning channel N31 to service (only one source range channel is required in Mode 5). The inspector concluded that the licensee identified the problem and took prompt corrective action.

The review to determine the cause of this event showed that a procedure change made to Step 6.4.2 of SI-156 on October 27, 1982, specified that the mode selector switch will be put into test position. This same requirement is specified in revision 6 of SI-156. The records further show that no procedure change of Step 6.4.2 was requested for revision 7 of SI-156. The licensee concluded that somehow in processing certain changes for revision 7 of SI-156, word processing personnel had called up an earlier revision in which Step 6.4.2 had not been corrected. No violation was issued in that this appears to be an isolated event in which the licensee identified the problem and took prompt corrective action. Appropriate action to preclude recurrence of this type of problem was still under review at the conclusion of the inspection. At the exit interview, the licensee agreed to perform a detailed review of SI-156 to verify that no other inadvertent changes were made to revision 7 which could affect the test results. This matter was identified for followup inspection as:

IFI (50-327/85-44-02): Review licensee action to prevent inadvertent changes in procedures and verify that no changes were made to SI-156 which affect the test results.

SI-156 was revised December 1, 1985, to require that jumpers are used to prevent loss of neutron source range detector voltage when the SSPS is removed from service.

c. Test Performance - Unit 1

(1) Method

The licensee has developed data analysis capability for the total time analysis in accordance with the requirements of BN-TOP-1, Revision 1, and mass point-linear regression analysis in accordance with the recommendations of ANSI/ANS-N56.8-1981. Since the upper confidence limit based on total time analysis did not meet the criteria for a short duration test, the licensee performed a 24-hour test. The leak rate and upper confidence limit (UCL) were determined for both the total time and mass point methods. The supplemental test was also performed using both test methods.

(2) Test Description - Unit 1

Pressurization of the containment was initiated at 0400 hours on December 2, 1985, and terminated at about 1400 hours with an average containment pressure of 12.75 psig. Stabilization was started at 1411 hours with readings from three RTD's and one dewcell suspect. Subsequently, cable problems were identified and corrected, causing the suspect instruments to read in the expected range. Stabilization criteria were met at 0632 hours on December 3. The Type A test was initiated at 0636 hours on December 3 and terminated at 0716 hours on December 4. The inherent data scatter in an ice condenser containment due to cycling of air handling units in the ice condenser caused data fluctuations which prevented meeting the total time UCL for a short duration test. The supplemental test was initiated at about 0900 hours on December 4 and terminated at 0544 hours December 5 with agreement achieved for both total time and mass point analysis techniques.

(3) Test Results - Unit 1

(a) Type A test

The Technical Specification allowable leakage (L_a) is 0.25 wt.% per day. Therefore, the allowable leakage for the integrated leak rate test of 0.75 L_a is 0.1875 wt.% per day. The licensee calculated the leak rate as follows:

	<u>Weight % Per Day</u>		
	<u>Mass Point</u>	<u>Total Time</u>	<u>Allowable Limit</u>
Leak Rate	0.076%	0.100%	
95% UCL	0.078%	0.123%	0.1875%

The inspectors calculations were in agreement with these values. The inspector concluded that the licensee has demonstrated acceptable containment leak rate in accordance with the requirements of Appendix J.

(b) Supplemental Test - Unit 1

Appendix J requires that a supplemental test be performed to verify the accuracy of the Type A test and the ability of the ILRT instrumentation to measure a change in leak rate. An acceptable supplemental test method is described in Appendix C of ANSI N45.4 - 1972, as follows:

A known leak rate (L_o) is imposed on the containment and the measured composite leak rate (L_c) must equal, within $\pm 0.25 L_a$, the sum of the measured leak rate (L_{am}) plus the known leak rate (L_o).

The acceptance criteria is expressed as:

$$L_o + L_{am} - 0.25 L_a < L_c < L_o + L_{am} + 0.25 L_a$$

Composite leak rates (L_c) were 0.3176 wt.% per day for total time analysis and 0.3118 wt.% per day for the mass point analysis. Substitution into the above equation with an imposed leak rate (L_o) of 0.2488 wt.% per day results in the following:

$$\text{Total Time: } 0.2863\% < 0.3176\% < 0.4113\%$$

$$\text{Mass: } 0.2623\% < 0.3118\% < 0.3873\%$$

The inspector concluded that the supplemental test results met the regulatory requirements defined in Appendix J to 10 CFR 50 and ANSI - N45.4.

(c) As found Type A Leak Rate

Appendix J to 10 CFR 50 and ANSI - N45.4 require that the containment leak rate be determined for the containment in the as-found condition prior to making leakage repairs and adjustments. In that it is practical to repair leakage paths prior to the Type A test to avoid having to run the Type A test twice, the NRC has determined that the as-found containment leak rate can be obtained by performing both an as-found and an as-left local leakage measurement for Types B and C leakage paths. The corrected leakage determined by using a minimum pathway leakage concept can then be added to the ILRT test UCL to obtain a reasonable estimate of the as-found Type A leakage. The corrected leakage for the Type B and C test program was 12.7948 scfh which is equiva-

lent to 0.014 wt.% per day. This adjustment yields an as-found Type A leak rate of 0.092 wt.% per day for mass point analysis and 0.137 wt.% per day for the total time analysis. These values are both within the allowable leakage limit of 0.1875 wt.% per day.

6. Review of Outstanding Items (90713, 92701)

The inspector reviewed two outstanding items during this inspection. The status of these items is summarized below:

(Closed) IFI (50-328/84-37-01) concerned review of the Unit 2 CILRT 90 day report.

The inspector reviewed the Containment Integrated Leak Rate Test report for the Unit 2 test, November 20 - 21, 1984. Report details and calculations were accurate. The failed test is described and the proposed Type A schedule is discussed. As this was the first CILRT failure on Unit 2, the licensee proposed to maintain the normal 40 ± 10 months Type A test schedule. This appears to be an acceptable position since the nature of the test failure was minor. Specifically, the initial Type A leakrate of 0.22 wt.% per day was between the test limit of 0.75 La (0.1875 wt.%) and the Technical Specification limit of La (0.25 wt.%). The excess leakage occurred through the packing of two instrument isolation valves.

The report contains data for Types B and C as-found and as-left leak rates in a form which can be used to determine the correction for the as-found Type A leak rate. However, no conclusions are stated in the report. The inspector advised the licensee that should a request be submitted to exempt the test from the failed category an analysis of the as-found Type A leak rate should be included in the submittal. This followup item is closed.

(Closed) IFI (50-328/81-30-01) concerned failure to document the differential pressure drop (dp) across the RCS full flow filter during the preoperational full flow testing.

The licensee stated that although not documented, the dp across the filter was observed to be less than one psi on a periodic basis. The test procedure (Appendix G of W-1.3) specified the limit as up to 17 psi at 550°F. Further, post test inspection by Westinghouse personnel of the filter and core internals showed that the filter was clean and no damage occurred to the core internals. This information was obtained from Preoperational Test Deficiency Report No. W-1.3, Ex-13, dated 9/7/81. This followup item is closed.