



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

Report Nos.: 50-269/87-11, 50-270/87-11, and 50-287/87-11

Licensee: Duke Power Company
 422 South Church Street
 Charlotte, NC 28242

Docket Nos.: 50-269, 50-270,
 and 50-287

License Nos.: DPR-38, DPR-47, and
 DPR-55

Facility Name: Oconee 1, 2, and 3

Inspection Conducted: March 11-19, 1987

Inspectors: H. L. Whitener 4-16-87
 H. L. Whitener Date Signed

H. L. Whitener / Son 4-16-87
 J. Zeiler Date Signed

Approved by: Frank Jape 4/21/87
 F. Jape, Section Chief Date Signed
 Engineering Branch
 Division of Reactor Safety

SUMMARY

Scope: This routine, announced inspection was conducted in the areas of containment integrated leak rate testing including review of the test procedure, witnessing of the test performance and evaluation of the test results.

Results: No violations or deviations were identified.

8704300239 870423
 PDR ADOCK 05000269
 Q PDR

REPORT DETAILS

1. Persons Contacted

Licensee Employees

M. Tuckman, Plant Manager
*J. Davis, Superintendent, Technical Services
*R. Bond, Performance Engineer
*K. Rohde, Test Engineer, Performance
*K. Chea, Test Engineer, Performance
*C. Harlin, Compliance Engineer
*F. Owens, Regulatory Compliance
M. Geckle, Test Engineer, Performance (Catawba Facility)
R. Smith, Technical Support Group, General Office
M. Hutcheson, Associate Engineer, General Office

NRC Resident Inspectors

J. Bryant, Senior Resident Operator
L. Wert, Resident Inspector

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on March 19, 1987, 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 following new item was identified during this inspection.

On new item was identified concerning the apparent malfunction of the pressure instrument during the Unit 1 integrated leak rate test. The licensee agreed to submit additional information to show that the instrument was functional subsequent to an apparent shift in the calibration of about 0.03 psi. This information will be submitted by August 1, 1987.

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

(Open) UNR 50-269/86-13-01: This item concerns the licensee investigation as to the cause of a pressure perturbation identified in the Oconee Unit 1 Type A test data and the possible effect on the test results. The Unit 1 Integrated leak Rate test report did not provide sufficient information to

evaluate the operability of the pressure instrument subsequent to the perturbation and did not provide an assessment of the leak rate based on resolution of the instrument problem.

The licensee will provide the additional information needed to complete the NRC review by August 1, 1987. This item remains open.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Containment Integrated Leak Rate Test (CILRT) - Unit 3 (70313) (70307)

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 Technical Specification 4.4, Appendix J to 10 CFR 50, ANSI-N45.4 and the test procedure PT/3/A/0150/03A, "Reactor Building 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 were 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 March 12-19, 1987. The following areas were inspected:

- (1) The test was conducted in accordance with an approved procedure.
- (2) Test prerequisites selected for review were found to be completed.
- (3) Selected plant systems required to maintain test control were 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 ten-minute intervals.

- (6) Problems encountered during the test were described in the test event log.
- (7) Temperature, pressure, dew point, and flow data were recorded at ten-minute intervals. Data were assembled and retained for final evaluation and analysis by the licensee. A final ILRT report will be submitted to the NRC.

No violations or deviations were identified in this review.

b. Procedure Review (70307)

The inspector reviewed portions of PT/3/A/0150/03A, "Reactor Building Integrated Leak Rate Test," to verify that test controls, valve alignments and acceptance criteria were specified. No major problems were identified; some minor adjustments were resolved with the licensee relating to clarification of test specifications. The licensee has identified add-on leakage in an enclosure to the procedure. The acceptance criteria in section 11 of the procedure specifies that the leak rate will be determined by mass point analysis on a minimum of 24 hours of data. An exemption to Paragraph III.A.3 of Appendix J was granted to Oconee in a letter dated February 24, 1987, to H. B. Tucker from H. N. Pastis. The exemption allows the use of the mass point analysis method. All other aspects of Paragraph III.A.3 remain in force.

Valve alignments, specified in TT/3/A/0375/09 were not reviewed except for changes to the procedure since this procedure was reviewed in detail during a previous inspection and is reported in IE Report 50-269/84-13 and 50-287/84-12. This procedure accomplishes the venting, draining, and alignment for the Type A test.

The inspector also reviewed PT/3/A/0150/03B, "Reactor Building Integrated Leak Rate Prerequisite Test." This procedure verified that the containment liner weld channels were vented to the containment pressure. The inspector concluded that the licensee had acceptable procedures for performance of the integrated leak rate test.

c. Integrated Leak Rate Test (ILRT) Performance (70313)

(1) Method

A 24-hour containment integrated (Type A) leak rate test and a four hour supplemental leak rate test were performed on the Unit 3 primary containment at a reduced pressure of 31 psig. Mass point-linear regression analysis was used by the licensee to determine the leak rate and 95% upper confidence limit (UCL). Leakage analysis was based on data taken at 10 minute intervals for a minimum of 24 hours.

(2) Test Description

After completion of the containment inspection, the containment was pressurized to the leakage rate test pressure, of 31.4 psig. Significant test events extracted from the test log were as follows:

Date	Time	Event
3/16	0410	Pressurization of the containment was initiated.
	1410	Pressurization of the containment was secured at 45.6 psia.
	1425	Temperature stabilization was initiated.
	1612	Leakage surveys were performed and the only significant leakage identified is through the airlock inner door handle packing. No repairs were made.
	1919	Containment air temperature met the stabilization criteria.
	2005	The airlock was pressurized to 28 psig (containment at 31 psig) to expedite stabilization of the leak rate. The inner door leakage was about 15 pounds per hour which contributed significantly to the leak rate.
	2049	The start time for the Type A test was declared.
	2130	Bubble test on outer airlock door shows no leakage.
3/17	0013	RTD 17 is erratic. Volume fraction reassigned to RTD 16.
3/18	0257	Type A test was terminated. The leak rate for a period of 29.97 hours was 0.119 wt% per day.
	0339	Imposed leak rate established at 7 scfm.

0349	Verification test was initiated.
0830	Verification test was terminated.
1440	Post test reactor building inspection showed no apparent damage.

(3) Test Results - Unit 3

(a) Type A Test

The allowable leakage (L_t) for Oconee Unit 3 is 0.176 wt.% per day. Therefore, the integrated leak rate test leakage limit of $0.75 L_t$ as required by Appendix J is 0.132 wt.% per day.

The licensee's test results met the acceptance criteria for mass point analysis as shown below: the values are expressed as weight percent per day for a 24-hour test period.

	<u>Mass Point</u>
L_t (allowable leakage)	0.1760
$0.75 L_t$ (test acceptance limit)	0.1320
Ltm (calculated leakage)	0.1007
UCL (95% upper confidence limit)	0.1055

The inspector calculated weighted averages for containment temperature, pressure and vapor pressure using the weighting factors and individual sensor data for a sample of data sets to verify agreement with the weighted averages generated by the licensee's computer program. Subsequently, the weighted averages generated by the licensee's program were used by the inspector to calculate mass, leak rate, and the 95% upper confidence leak rate. The inspector's calculations agreed with the licensee's calculations.

(b) Supplemental Test

Appendix J requires that a supplemental test be performed to verify the accuracy of the Type A test and the ability of the CILRT 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 $\pm 0.25 L_t$, the sum of the measured Type A leak rate (Ltm) plus the known leak rate (L_o).

The acceptance criteria is expressed as:

$$L_o + L_{tm} - 0.25 L_t < L_c < L_o + L_{tm} + 0.25 L_t$$

A 4.68-hour supplemental test was performed by the imposed leak rate method described in Appendix C to ANSI-N45-4-1972 using the mass point analysis technique to determine L_c . The following values in units of wt.% per day were obtained:

	<u>Mass Point</u>
L _{tm}	0.1007
L _c	0.2463
L _o	0.1699
0.25L _t	0.044

Using the above values, L_c must fall within the limits in wt.% as follows:

	<u>Mass Point</u>
Upper Limit	0.3146
L _c	0.2463
Lower Limit	0.2266

As indicated, L_c is within the specified limits for the mass point analysis technique.

6. Other Areas Inspected Relative to Leak Rate Testing

a. Computer Leak Rate Program

The licensee has upgraded the data acquisition system to provide adequate resolution of the state-of-the-art instrumentation input to the computer. A benchmark test was used to verify operability of the system. The inspector obtained the benchmark test data and processed it through the NRC CILRT 2 (11-4-86) test program. The NRC program calculated the same results as the licensee's program. The inspector also obtained and processed several sets of raw data from the current leak rate test and obtained the same averaged results as the licensee. The inspector concluded that there were no unresolved questions related to data processing.

b. Pressurization of the Personnel Airlock

During the stabilization period, the licensee identified a large leak path through the door handle packing of the airlock inner door. The leakage was estimated to be about one-half of L_t and had a significant effect on the apparent containment leakage. Due to the large volume of the airlock, it was estimated that the leakage would affect the

apparent containment leak rate for many hours. To expedite measurement of actual containment leakage, the licensee pressurized the airlock through the local leak rate test connection to 28 psig, 3 psi below the containment pressure. The inspector reviewed this situation and determined that the Type A test result was not adversely affected for reasons as follows:

- (1) The Type A test is a single barrier test. If the outer door was leaktight, the inner door leak would not be seen as containment leakage once the airlock becomes pressurized to containment pressure. Further, any leakage through the outer door would still be evident.
- (2) A full pressure local leak rate test performed on the airlock just before the Type A test showed no leakage through potential leakage paths in the outer door when bubble tested. The leakage was noted during this test but was thought to be leaking into containment through the equalizing valve in the inner door which is expected to seal with containment pressure.
- (3) Rapid pressurization of the airlock would tend to unseat rather than seal the outer door.

c. Advancing the Test Start Time

The licensee performed a Type A leak rate measurement from 2049 hours on March 16, 1987 to 0258 hours on March 18, 1987, about 30 hours. The leak rate and 95% upper confidence limit (UCL) for this period was 0.118 and 0.123 wt.% per day, respectively. These values are within the acceptance criteria of $0.75 L_t$ (0.132 wt.% per day). In that containment stabilization at Oconee typically takes about 12 to 16 hours, the leak rate was still decreasing when the test was started after a six-hour stabilization period. The licensee extended the test to 30 hours in order to advance the start time to 0240 hours on March 17, 1987. Excluding the first six hours of rapidly changing leak rates yielded a 24-hour test with a leak rate and 95% UCL of 0.101 and 0.105 wt.% per day, respectively. These values met the limits of the verification test. The actual leak rate over the last six hours of the test was in the range of 0.06 to 0.07 wt. per day. These values also meet the verification test limits. The inspector concluded that advancing the start time did not represent manipulation of the data in order to pass the test.

d. As Found Type A Leak Rate

The licensee's program for controlling the "as found" leak rate was reviewed to determine that control was established. Control is accomplished through the established maintenance controls. The isolation barriers are identified to the operations personnel. If maintenance on one of these barriers is requested, operations will

verify with the performance group that the required leak testing is completed before releasing the system for maintenance. The established local leak rate test procedures have a status blank to indicate whether a test is an "as found" or "as left" test. The licensee had not completed the analysis of the data but indicated that no excessive leakage through both isolation barriers in a leak path were identified. The "as found" Type A test result will be reviewed in the Leak Rate Test Report submitted to the Commission.