



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
101 MARIETTA ST., N.W., SUITE 3100  
ATLANTA, GEORGIA 30303

Report No.: 50-389/82-65

Licensee: Florida Power and Light Company  
9250 West Flagler Street  
Miami, FL 33101

Docket No.: 50-389

License No.: CPPR-144

Facility Name: St. Lucie 2

Inspection at St. Lucie site near Ft. Pierce, Florida

Inspector: H. L. Whitener 1/13/83  
H. L. Whitener Date Signed

Approved by: F. Jape / EHB 1/13/83  
F. Jape, Section Chief Date Signed  
Engineering Program Branch  
Division of Engineering and Operational Programs

SUMMARY

Inspection on November 27 - December 3, 1982

Areas Inspected

This routine, announced inspection involved sixty-four inspector-hours on site in the areas of integrated and local leak rate testing including examination of test controls, procedure review and test witnessing.

Results

Of the three areas inspected, no violations or deviations were identified.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*G. J. Boissy, Startup Superintendent
- \*R. R. Jennings, Technical Staff Supervisor
- B. Parks, Technical Staff
- \*D. W. Walton, Startup Engineer
- \*H. S. Ruff, Quality Control

#### Other Organizations

##### EBASCO

- \*P. B. Dillon, ILRT Manager
- J. Grauss, ILRT Supervisor
- T. Musto, ILRT Supervisor

#### NRC Resident Inspector

- \*S. A. Elrod, Senior Resident Inspector

\*Attended exit interview

### 2. Exit Interview

The inspection scope and findings were summarized on December 3, 1982, with those persons indicated in paragraph 1 above. The inspector stated that: (1) the local leak rate test program was reviewed and found acceptable, (2) the full pressure integrated leak rate test was reviewed and found acceptable, and (3) the half pressure integrated leak rate test was reviewed and found unacceptable.

The licensee was informed that an acceptable half pressure test is not required unless he intends to perform future periodic integrated leak rate tests at half pressure. If future periodic tests are to be done at half pressure, the licensee must resolve the issue of the negative leak rate, potential outgassing and the appropriate value to be used for allowable leakage rate at reduced test pressure (Lt).

The licensee acknowledged the inspection findings.

### 3. Licensee Action on Previous Enforcement Matters

Not inspected.

## 4. Unresolved Items

Unresolved items were not identified during this inspection.

## 5. Containment Integrated Leak Rate Test (70307, 70313)

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 10CFR50, ANSI 45.4, Section 6 of the FSAR, the test procedure 2-1300080 "Integrated Leak Rate Test", and with the recommendations specified in industry standard ANSI/ANS 56.8, 1981.

Selected sampling of the licensee's activities which were inspected included: (1) review of the test procedure to verify that the procedures were properly approved and conformed to the regulatory requirements listed above; (2) observation of test performance to determine that test prerequisites were completed, special equipment was installed and calibrated and appropriate data were recorded and analyzed; and, (3) preliminary evaluation of leakage rate test results to verify that leak rate limits were met. Pertinent aspects of the test 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 November 27 - December 3, 1982. The following items were inspected:

- (1) The test was conducted in accordance with an approved procedure maintained at the test control center. Test discrepancies and changes to the procedure were documented in the procedure.
- (2) Selected test prerequisites were reviewed and found to be completed.
- (3) Selected 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 15 minute intervals.
- (6) Problems encountered during the test were described in the test event log.

- (7) Pressurized gas sources were reviewed for proper isolation and venting to preclude in-leakage or interference of out-leakage through containment isolation valves.
- (8) Selected procedure valve alignments were reviewed against system drawings to verify correct boundary alignment and venting and draining to specific systems.
- (9) A sampling of valve positions was observed to verify conformance to procedure valve alignment.
- (10) Temperature, pressure, dew point, and flow data were recorded at 15 minute intervals. Data were assembled and retained for final evaluation and analysis by the licensee. A final ILRT report will be submitted to the Office of Nuclear Reactor Regulation.

No violations were identified in the above areas.

b. Integrated Leak Rate Test (ILRT) Performance

(1) Method

The containment leak rate was determined by the mass point analysis and linear regression techniques on a minimum of 24 hours of mass data recorded at 15 minute intervals.

Tests were performed at nominal containment pressures of 22 psig (half pressure) and 44 psig (full accident pressure). A supplemental test was performed for each test condition.

(2) Test Description

In that this was a preoperational test, the containment was initially pressurized to 50.0 psig for the structural integrity test and then depressurized for the half pressure ILRT 24 hour test. Test sequence for the leak testing was as follows:

<u>Date</u>	<u>Time</u>	<u>Condition</u>
11/27	1600	Depressurized from 50 psig to 22.9 psig for half pressure ILRT
	2045	Temperature stabilization criteria met.
	2330	Time zero for ILRT reestablished.

<u>Date</u> (Continued)	<u>Time</u>	<u>Condition</u>
11/28	2330	24 hour ILRT at 22 psig terminated and supplemental test initiated.
11/29	0500	Supplemental test terminated.
	1249	Containment pressurized to 45.7 psig for full pressure ILRT.
	1730	Temperature stabilization criteria met.
	1745	Start full pressure ILRT 24 hour run.
11/30	1000	Observed discontinuity in mass data as a result of step change of about 0.05 degree F at nearly all temperature readout locations.
	1215	Time zero reestablished for ILRT 24 hour run.
12/1	1215	Full pressure ILRT terminated and supplemental test initiated.
	1545	Supplemental test terminated.
	1800	Containment depressurization initiated.
12/2	1430	Containment post test inspection performed.

### (3) Test Results

The measured leak rate (Ltm) for the half pressure ILRT was - 0.016 wt.% (as used in this report wt.% indicates percent of containment air mass by weight at test pressure per 24 hours). The negative leak rate shows an apparent in-leakage of air to the containment. The licensee's preliminary evaluation of this condition was that the indicated in-leakage resulted from attempting to measure an essentially zero leakage with unstable containment atmosphere conditions. Due to the depressurization

from the structural integrity test, air in the containment was cooled below the temperature of the structural materials. Over the period of testing, containment air average temperature increased about one degree F. An inherent delay in sensing a change in containment air average temperature coupled with the variable rate of temperature change could induce a small error in the leak rate calculations.

Another potential source of error is outgassing. The containment air pressure was reduced from 50 psig to 22.9 psig. Under these conditions, air trapped at the higher pressure in insulation, concrete, volumes between isolation valves where the inside valve is leaking, or in vessels vented to containment atmosphere will bleed back into the net free volume of the containment. Air feeding into the containment free volume at the same time the measurement of air lost from the containment volume is being made will affect the measured leak rate in a non-conservative manner. The above items were discussed with test engineers and licensee management. At the exit interview, the inspector pointed out that the half pressure test is not required if periodic integrated tests are performed at full pressure. If the licensee intends to do periodic integrated leak rate tests at half pressure the problem of a negative leak rate and potential outgassing must be resolved and included in the analysis presented in the final leak rate report.

The full pressure test measured leak rate ( $L_m$ ) was 0.024 wt.% with an upper limit of the 95% confidence level at 0.026 wt.%. This is about 5% of the allowable leak rate of 0.5 wt.%. Time zero for the test was established at 5:45 p.m. on 11/29/82. At about 10:00 a.m. on 11/30/82, a discontinuity in the calculated air mass occurred as a result of a sudden step change of 0.05 degrees F in the RTD readings. The data stabilized at a higher air mass but essentially parallel to previous data. The problem was believed to be in the Numatron (multichannel data readout instrument) since all RTDs were affected. Time zero for the 24-hour run was reestablished at 12:15 p.m. on 11/30/82. The test was terminated at 12:15 p.m. on 12/1/82 without further problems. Post calibration of the Numatron indicated that a calibration shift had occurred.

#### (4) 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 ILRT instrumentation to measure a change in leak rate. 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 ( $L_m$ ) plus the known leak rate ( $L_o$ ).

The acceptance criteria is expressed as:

$$\begin{aligned} Lo + Lam \text{ (or } Ltm) - 0.25 La \text{ (or } 0.25 Lt) &\leq LC \leq \\ Lo + Lam \text{ (or } Ltm) + 0.25 La \text{ (or } 0.25 Lt) &\end{aligned}$$

Results of the supplemental tests show that the composite leak rate  $L_c$  was within limits for the full pressure test but were within limits only under certain assumptions for the half pressure test. Results were as follows:

(a) Half pressure test:

Using the measured leak rate of - 0.016 wt.% the values of the equation are:

$L_c$ (measured)	0.276 wt.%
$L_o$ (imposed)	0.251 wt.%
$L_{tm}$	-0.016 wt.%
$0.25 L_t$	0.088 wt.%

The limits are:

$$0.147 \text{ wt.} \% \leq 0.276 \text{ wt.} \% \leq 0.323 \text{ wt.} \%$$

These values appear to meet the acceptance criteria; however, the value used for  $0.25 L_t$  was obtained from using the expression  $L_t = L_a (P_t/P_a)^{1/2}$ .

Appendix J allows this formula when  $L_{tm}/L_{am} > 0.7$ .

In this case the ratio ( $L_{tm}/L_{am}$ ) yields a negative value which is not meaningful. Before the supplemental test result for the half pressure test can be considered valid the negative leak rate problem must be resolved. As previously indicated, the resolution of this problem is necessary only if the licensee intends to perform ILRT's at half pressure.

(b) Full Pressure test:

Using the measured leak rate of 0.024 wt.% the values for the equation are:

$L_c$ (measured)	0.279 wt.%
$L_o$ (imposed)	0.270 wt.%
$L_{am}$	0.024 wt.%
$0.25 L_a$	0.125 wt.%



The limits are:

0.169 wt.% ' 0.279 wt.% ' 0.419 wt.%

The inspector concluded that the preoperational full pressure test measured leak rate and supplemental test meet the requirements of Appendix J to 10 CFR 50.

6. Local Leak Rate Test Program (61720)

The inspector reviewed the local leak rate test program to determine that the licensee has established and implemented controls and procedures which will ensure that the requirements of Appendix J to 10 CFR 50 are met for Type B (Penetration) and Type C (Isolation Valve) leak rate tests. Documents reviewed included:

- a. "Local Leak Rate Test, Test procedure 2-1300082", dated 5/17/82.
- b. "Mechanical Test Control, SQP-67" - This procedure controls construction work on penetrations which have been tested and retested of these penetrations when required.
- c. Letter to R. Sipos from G. Boissy dated 6/8/82. - This letter specifies the test packages and FP&L startup group control for local testing.

The Construction Test Group is responsible for conducting the leak rate tests. A data package is submitted to the FP&L startup engineer. The startup engineer verifies the valve alignment against the latest design drawing and returns the package to construction for performance of the test. When the test is completed, the data package is submitted to the FP&L startup engineer who performs the final evaluation of test results. The inspector reviewed completed data packages for selected Type B and Type C local tests and found that proper valve alignments were identified in the data packages. The inspector concluded that the licensee has established and implemented an acceptable program.

Within this area inspected, no violations were identified.