

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-237/87010(DRS); 50-249/87009(DRS)

Docket Nos. 50-237; 50-249

Licenses No. DPR-19; DPR-25

Licensee: Commonwealth Edison Company  
P.O. Box 767  
Chicago, IL 60690

Facility Name: Dresden Nuclear Power Station, Units 2 and 3

Inspection At: Morris, Illinois

Inspection Conducted: March 9 through May 13, 1987

Inspectors: *new/so*  
Rogelio Mendez

5/27/87  
Date

*new/so*  
F. A. Maura

5/27/87  
Date

*so*  
Approved By: Geoffrey C. Wright, Chief  
Test Programs Section

5/27/86  
Date

Inspection Summary

Inspection on March 9 through May 13, 1987 (Reports No. 50-237/87010(DRS);  
No. 50-249/87009(DRS))

Areas Inspected: Routine announced inspection by Region III based inspectors of licensee action on previous inspection findings; Containment Integrated Leak Rate Test (CILRT) procedure; CILRT performance witnessing; CILRT results and CILRT report. This inspection was conducted per Inspection Procedures No. 61720; No. 70307; No. 70313; No. 70323; No. 90713, and No. 92701.

Results: In the areas inspected no violations or deviations were identified.

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## DETAILS

### 1. Persons Contacted

#### Commonwealth Edison Company (CECo)

- \*R. M. Jeisy, Station QA Superintendent
- \*R. W. Stobert, Director QA (Operations)
- \*J. R. Williams, Station Regulatory Assurance
- \*M. Moy, Station Technical Staff
- \*E. Armstrong, Station Technical Staff
- \*R. J. Whalen, Systems Group
- \*J. F. Lizalek, Systems Group
- J. Achterberg, Technical Staff Supervisor
- E. Kotrich, Station Technical Staff
- L. Bihlman, Station Technical Staff
- B. McCabe, Station Technical Staff
- J. Glover, Nuclear Services Technical
- C. Rapp, Computer Technician

\*Denotes persons in attendance at the exit conducted on May 13, 1987.

The inspectors also interviewed other licensee employees including members of the technical and operating staff.

### 2. Licensee Action on Previous Inspection Findings

- a. (Closed) Open Item (237/85015-01): The licensee had incorrectly applied the method for determining the sum of Type B and C test results. Appendix J states that an acceptable method for determining the 0.6 La limit is to utilize the maximum pathway leakage. The maximum pathway leakage is 100 percent of the leakage measured when pressurizing between two isolation valves; however, the licensee was incorrectly using 50 percent of the measured leakage. The inspector reviewed the results of the Unit 2 1984-1985, Unit 3 1985-1986 outages and the present Unit 2 outage and determined that the licensee had correctly implemented the maximum pathway leakage methodology. In addition, the inspector determined that since 1980, the licensee has reported the as-found through leakage for Type B and C testing that exceed the 0.6 La limit.
- b. (Closed) Open Item (237/85015-02): The licensee had incorrectly applied the method for determining the sum of the as-found and as-left Type A test results. Although the licensee was using a conservative approach in determining minimum pathway leakage, there were situations where the results were not conservative. The inspector reviewed the revised minimum pathway leakage results of the last three outages. No problems were found in the results of the Unit 2 1984-1985 and 1986-1987 outages. However, in the Unit 3

1985-1986 outage, the licensee used 50 percent of the measured leakage on two isolation valves whose repair entailed a change in valve packing. The licensee was informed of the inconsistency and the results were changed. The Type A as-found result changed from 455 SCFH to 460 SCFH which amounted to a change of approximately 1 percent of the 0.75 La limit. Since the change was minimal, the inspector and the licensee agreed that for the Unit 3 November 20, 1986, licensee report, an additional formal submittal was not necessary.

### 3. Containment Integrated Leak Rate Test Procedure Review

#### a. Procedure Review

The inspectors reviewed the licensee's procedures titled, "Unit 2/3 Integrated Primary Containment Leak Rate Test," Revision 8, relative to the requirements of 10 CFR 50, Appendix J, ANSI N45.4-1972 and FSAR. With the exception of the following open item, the procedure was adequate.

Section 5.2 of the Dresden FSAR lists the total containment volume as 275,481 cubic feet. The total free volume used during the test is listed as 288,966 cubic feet in Appendix F of the licensee's CILRT procedure. The difference between the two containment volumes is approximately five percent and affects the calculation of the induced leakage  $L_o$ , which shows in the second decimal place of the supplemental test. The licensee stated that they were in the process of reviewing the differences in containment volumes but had not determined the reason for the discrepancy. The issue is considered an open item, pending resolution of the actual containment volume (237/87010-01; 249/87009-01).

#### b. Clarifications of Appendix J Requirements

To ensure the licensee's understanding of Appendix J requirements, the inspector conducted numerous discussions with licensee personnel during the course of the inspection. The following is a summary of the clarifications discussed with the licensee.

- (1) The only method of data reduction acceptable to the NRC are total time or point-to-point as described in ANSI N45.4-1972 including a statistically calculated instrument error analysis. The following options are available to the licensee and are suggested in the following order:

- (a) Total time (<24 hour duration test) in accordance with Bechtel Corp. Topical Report BN-TOP-1, Revision 1. Whenever this method is used BN-TOP-1 must be followed in its entirety except for any section which conflicts with Appendix J requirements.

- (b) Total time (>24 hour duration test) using single sided 95% UCL.
  - (c) Proposed Regulatory Guide MS 021-5, Regulatory Position 13. If this method is utilized the licensee must submit an exemption request to NRC and receive approval for its use prior to the expiration of the Type A test frequency requirements stated in the Technical Specifications.
- (2) Periodic Type A, B, and C tests must include as-found results as well as as-left. If Type B and C tests are conducted prior to a Type A the as-found condition of the containment must be calculated by adding any improvements in leakage rates, which are the results of repairs and adjustments (RA), to the Type A test results using the "minimum pathway leakage" methodology. This method requires that:
- (a) In the case where individual leak rates are assigned to two valves in series (both before and after the RA), the penetration through leakage would simply be the smaller of the two valves' leak rates.
  - (b) In the case where a leak rate is obtained by pressurizing between two isolation valves and the individual valve's leak rate is not quantified, the as-found and as-left penetration through-leakage for each valve would be 50 percent of the measured leak rate if both valves are repaired.
  - (c) In the case where a leak rate is obtained by pressurizing between two isolation valves and only one valve is repaired, the as-found penetration leak rate would conservatively be the final measured leak rate, and the as-left penetration through leak rate would be zero (this assumes the repair valve leaks zero).
- (3) Penetrations which are required to be Type C tested, as described in the FSAR and SER, must be vented inside and outside the containment during the CILRT. All vented penetrations must be drained of water inside the containment and between the penetration valves to assure exposure of the containment is controlled by the requirement that the valves be subjected to the post-accident differential pressure, or proof that the system was built to stringent quality assurance standards comparable to those required for a seismic system.
- (4) Whenever penetration configurations during a CILRT deviate from the ideal, the results of LLRTs for such penetrations must be added as a penalty to the CILRT results at the 95% confidence level. This penetration leakage penalty is determined using

the "minimum pathway leakage" methodology. This methodology is defined as the minimum leakage value that can be quantified through a penetration leakage path (e.g., the smallest leakage through two valves in series). This assumes no single active failure of redundant leakage barriers. Additionally, any increase in containment sump, fuel pool, reactor water, or suppression pool level during the course of the CILRT must be taken as a penalty to the CILRT results. If penalties exist, they must be added (subtraction is never permitted) to the upper confidence level of the CILRT results.

- (5) The start of a CILRT must be noted in the test log at the time the licensee determines that the containment stabilization has been satisfactorily completed. Reinitializing a test in progress must be "forward looking," that is, the new start time must be the time at which the decision to restart is made.

This also implies that the licensee has determined that the test has failed, and has enough data to quantify the leakage rate. Any deviation from these positions should be discussed, and documented, with the NRC inspector as they occur to avoid later invalidations of the test results. Examples of acceptable deviations of reinitializing the start time of the test in the past are: time at which a leaking penetration which has an obvious effect on the test data was secured, accidental opening and later closing of a valve which has an obvious effect on the test data, the time at which an airlock outer door was closed and the inner door was open.

- (6) The supplemental or verification test should start within one hour after the completion of the CILRT. If problems are encountered in the start of the supplemental test, data recording must continue and be considered part of the CILRT until the problems are corrected and the supplemental test can begin.
- (7) For the supplemental test, the size of the superimposed leak rate must be between 0.75 and 1.25 times the maximum allowable leak rate  $L_a$ . The higher the value, the better. The supplemental test must be of sufficient duration to demonstrate the accuracy of the test. The NRC looks for the results to stabilize within the acceptance criteria, rather than the results being within the acceptance criteria. Whenever the BN-TOP-1 methodology is being used, the length of the supplemental test cannot be less than approximately one-half the length of the CILRT.
- (8) During a CILRT, it may become necessary to reject or delete specific sensors or data points due to drifting or erroneous sensors, or data outliers. Data rejection criteria should be developed and used so that there is a consistent, technical

basis for data rejection. One example of an acceptable method for data outliers is described in an Appendix to ANSI/ANS 56.8-1981. Sensor data rejection criteria should be plant specific and based upon a sensor's trend relative to the average scatter, slope and/or absolute output of the sensor.

- (9) An acceptable method for determining if the sum of Type B and C tests exceeds the 0.60 La Appendix J limit is to utilize the "maximum pathway leakage" method. This methodology is defined as the maximum leakage value that can be quantified through a penetration leakage path (e.g., the larger, not total, leakage of two valves in series). This assumes a single active failure to the better of two leakage barriers in series when performing Type B or C tests.
- (10) Test connections must be administratively controlled to ensure their leak tightness or otherwise be subject to Type C testing. One way to ensure their leak tightness is to cap, with a good seal, the test connection after its use. proper administrative controls should ensure valve closure and cap re-installation within the local leak rate testing procedure, and with a checklist prior to unit restart.
- (11) Whenever a valve is replaced, repaired, or repacked during an outage for which Type A, B, and/or C surveillance testing was scheduled, local leak rate testing for the as-found as well as the as-left condition must be performed on that penetration. In the case of a replaced valve, the as-found test can be waived if no other containment isolation valve of similar design exists at the site.

No violations or deviations were identified.

#### 4. Containment Integrated Leak Rate Test Witnessing

##### a. Test Instrumentation

The inspector reviewed the calibration data and determined all the instruments used in the CILRT had been properly calibrated and that the correct weighting factors had been placed in the computer program as required. The following instrumentation was used throughout the test:

<u>Type</u>	<u>Quantity</u>
RTDs	24
Humidity	9
Pressure Gauges	2
Flowmeter	1

Several severe instantaneous drops in temperature and humidity readings were recorded by most sensors during the test. The readings always recovered promptly which indicated the drops were due to malfunctioning of the data acquisition system (DAS). The licensee was not able to determine and correct the cause during the test. The licensee rejected 13 data points during the Type A test and one data point during the supplemental test based on the magnitude and character of the reading changes. The inspector concurred with the licensee's action, but based his data rejection on the outlier criteria given in Appendix D of ANSI 56.8, 1981 for a 1% rejection level.

On March 30, 1987, after completion of the CILRT, the licensee attempted to intentionally cause the data to spike by creating noise or electrical interference. The door leading into the personnel access hatch, where the DAS was located, was slammed several times and according to the licensee, this caused data to spike. The licensee also discovered that the hardware connection at the back of the DAS had become loose. The licensee found that once the connector was firmly in place, the data spiking stopped. Although, it appears that the licensee has found the root causes to the data spiking problem, the inspector discussed with the licensee the need to eliminate problems with data acquisition prior to the next Type A test. This item is open (237/86010-02).

b. Witness of Test

The inspector witnessed portions of the CILRT on March 29, 1987, and noted that test prerequisites were met and that the appropriate revision to the surveillance procedures was followed by test personnel.

5. Test Results Evaluation

a. CILRT Data Evaluation

A 12 hour CILRT was performed during March 29, 1987, at 65 psia following satisfactory completion of the required temperature stabilization period. Data was collected every 10 minutes. The inspector independently monitored and evaluated leak rate data using total time (BN-TOP-1, Rw. 1) formulas to verify the licensee's calculations of the leak rate and instrument performance. There was good agreement between the inspector's and licensee's results as indicated by the following summary (units are in weight percent per day).

<u>Measurement</u>	<u>Licensee</u>	<u>Inspector</u>
Leak rate measured during CILRT (Lam)	0.304	0.308

<u>Measurement</u>	<u>Licensee</u>	<u>Inspector</u>
Lam at upper 95% confidence level	0.510	0.513

Appendix J acceptance criteria at 95% UCL:  $< 0.75 La = < 1.2$  weight percent per day.

b. Supplemental Test Data Evaluation

After the satisfactory completion of the CILRT a known leakage rate (based on inspector's independent readings and calculations) of 10.84 scfm, equivalent to 1.320 weight percent per days was induced. Data was collected and analyzed by the licensee every 10 minutes. The inspector independently monitored and evaluated leak rate data to verify the licensee's results. After six hours the supplemental test was terminated with satisfactory results as indicated by the following summary (units are in weight percent per day).

<u>Measurement</u>	<u>Licensee</u>	<u>Inspector</u>
Measured leakage rate, Lc, during supplemental test	1.455	1.455
Induced leakage rate, Lo	1.302	1.328
Lc-(Lo + Lam)	-0.151	-0.181

Appendix J acceptance criteria:  $-0.400 \leq [Lc-(Lo+Lam)] \leq +0.400$ .

c. CILRT Valve Lineup Penalties

Due to valve configurations which deviated from the ideal penetration valve lineup requirements for the CILRT, the results of local leak rate tests for such penetrations must be added as a penalty to Lam at the 95% UCL. The following penalties must be added using the minimum pathway leakage method:

<u>Penetration</u>	<u>Local Leak Rate Test Valve (Units are in SCFH)</u>
X-107B	11.1
X-107A	2.2
X-111A/X-111B	4.3
X-138	8.3
X-113	1.7
X-109A	7.3
X-311A	0.1
X-311B	0.4



<u>Penetration</u>	<u>Local Leak Rate Test Valve</u> <u>(Units are in SCFH)</u>
X-116A	0.6
X-145	1.9
X-150A	10.3
X-317	8.3
X-122	3.8
X-101	3.0

Total = 63.3 SCFH = 0.123 wt. %/day.

After taking these local penalties into account, the upper confidence value for containment leakage is equal to 0.636 weight percent per day, well within the acceptable value of < 1.2 weight percent per day.

d. As-Found Condition of CILRT

The as-found condition is the condition of the containment at the beginning of the outage prior to any repairs or adjustments to the containment boundary. The inspector reviewed the licensee's summary of the containment penetration local leak rate tests (Type B and C) performed prior to the CILRT in order to determine the amount of leakage rate improvement due to repairs and adjustments. Based on the results reviewed it was determined that the amount of leakage improvement prior to the CILRT equaled 67.4 SCFH or the equivalent of 0.131 wt. %/day. The as-found CILRT results for the containment was 0.767 wt. %/day which is within the allowable limit of < 1.2 weight percent per day.

No violations or deviations were identified.

6. Review of Dresden Unit 3 Integrated Leak Rate Test Report

The inspector reviewed the licensee's "Dresden Unit 3, Containment Building Integrated Leakage Rate Test" report submitted to the NRC on November 20, 1986, and determined that it accurately reported the leakage rates and events regarding the Unit 3 Type A test performed on July 24-26, 1986. The inspector also reviewed the results of the Type B and C tests and determined that the licensee was following the correct methodology to determine minimum and maximum pathway leakage results. The following results were verified by the inspector.

a. CILRT Data Evaluation

<u>Measurement</u>	<u>Licensee</u>	<u>Inspector</u>
Leakage rate measurement during CILRT (Lam)	0.503	0.504

<u>Measurement</u>	<u>Licensee</u>	<u>Inspector</u>
Lam at upper 95% confidence level	0.657	0.655

Appendix J acceptance criteria at 95% UCL < 0.75 La or 1.2 wt. %/day.

b. Supplemental Test Data Evaluation

After satisfactory completion of the CILRT, the licensee attempted to perform a verification test and induced a flow of 1.760 wt. %/day (14 SCFM). The first verification test was terminated after four hours due to the large discrepancy between the actual calculated leakage rate and the expected calculated leakage rate. The licensee's verification test result of 1.210 wt. %/day was significantly below the expected results of between 1.822 wt. %/day and 2.622 wt. %/day. The licensee determined that the cause of the failure was due to the improper operation of the flow meter used to measure the induced flow. The licensee had not realized that the flow meter was calibrated at a discharge pressure of 48 psia and not atmospheric (14.7 psia), consequently the actual flow induced was 6.78 SCFM not 14 SCFM. The licensee corrected the problem and performed a second verification test. After six hours, the supplemental test was terminated with satisfactory results.

During inspection of the Unit 2 CILRT, the inspector reviewed the calibration records of the flow meter used in the Unit 3 CILRT and verified that the flow meter had been properly calibrated at 48 psig. The final result was as follows (units are in weight percent per day).

<u>Measurement</u>	<u>Licensee</u>	<u>Inspector</u>
Lc - (Lo + Lam)	-0.078	-0.084

Appendix J acceptance criteria:  $-0.4 \leq [Lc - (Lo + Lam)] \leq +0.4$ . As indicated above, the licensee's verification test results were satisfactory.

c. As-Found Condition of CILRT Results

Measurement (Units are in weight percent per day)

Penalties incurred due to repairs or adjustments	0.162
CILRT valve lineup penalties	0.070
As-left Type A test results	0.655
Total as-found	0.887

The acceptance criterion is < 1.2 wt % /day. The licensee passed the Unit 3 1986 CILRT in the as-found condition.

7. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Paragraphs 3.a and 4.a.

8. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) on May 13, 1987, at the conclusion of the inspection. The inspector summarized the scope and findings of the inspection. The licensee acknowledged the information and did not indicate that any of the information disclosed during the inspection could be considered proprietary in nature.