

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-265/85018(DRS)

Docket Nos. 50-265

License No. DPR-30

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

Facility Name: Quad Cities Nuclear Power Station, Unit 2

Inspection At: Cordova, IL

Inspection Conducted: May 25 through June 24, 1985

Inspectors: *W.G. Guldemond for*
D. S. Butler

7/5/85
Date

W.G. Guldemond for
S. M. Hare

7/5/85
Date

Approved By: *W.G. Guldemond*
W. G. Guldemond, Chief
Operational Programs Section

7/5/85
Date

Inspection Summary

Inspection on May 25 through June 24, 1985 (Report No. 50-265/85018(DRS))

Areas Inspected: Routine, announced inspection by region based inspectors of previous inspection findings; licensee event reports; containment integrated leak rate test (CILRT); Technical Specifications; local leak rate results and test procedures; as found CILRT results; and independent inspection of safety related transmitters. The inspection involved 79 inspector-hours onsite by two NRC inspectors including 23 inspector-hours onsite during off-shifts. An additional 29 inspector-hours were expended in the Region III office.

Results: Of the seven areas inspected, no violations or deviations were identified in six areas. In the remaining area, one violation was identified; (failure to control a field change with control measures commensurate with those applied to the original design - Paragraph 8).

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DETAILS

1. Persons Contacted

a. Licensee Employees

- *R. Bax, Production Superintendent
- +*T. Tamlin, Technical Services Superintendent
- *G. Spedl, Technical Services Assistant Superintendent
- *D. VanPelt, Maintenance Assistant Superintendent
- +*E. Mendenhall, Technical Staff, Thermal Engineer
- *R. Rustic, Technical Staff, Integrated Coordinator
- *B. Strub, Compliance Coordinator
- *C. Norton, Quality Assurance Engineer
- +*D. Rajcevich, Instrumentation Maintenance Engineer

b. NRC Representatives

- A. Madison, Senior Resident Inspector
- A. Morrongiello, Resident Inspector

*Denotes those attending the May 28, 1985 exit interview.

+Denotes personnel present at the June 24, 1985 teleconference.

2. Action on Previous Inspection Findings

- a. (Closed) Noncompliance Item (265/84-07-01): Licensee failed to measure the actual leakage of a 1/2 inch torus level instrument line flange during the 1984 CILRT. The licensee has trained testing personnel and incorporated a note in the CILRT procedure to prevent recurrence.
- b. (Closed) Noncompliance Item (265/84-07-02): Licensee had failed to perform local leak rate tests (Type B) on a 1/2 inch torus level instrument line flange since its original installation. The licensee has performed extensive reviews of design changes and existing drawings to prevent recurrence.

3. Licensee Event Report Followup

- a. (Open) Licensee Event Report No. 85-06-00 Item (265/85006-LL): Two Main Steam Isolation Valves failed their local leak rate tests. At the time of the inspection the licensee had not prepared a supplemental report as committed to in Revision 0, of the LER.
- b. (Open) Licensee Event Report No. 85-07-00 Item (265/85007-LL): The combined leakage rate for all penetrations and valves leaked in excess of the Technical Specification allowable (0.6La). At the time of the inspection the licensee had not prepared a supplemental report as committed to in Revision 0, of the LER.

No violations or deviations were identified.

4. Containment Integrated Leak Rate Test (CILRT)

a. Procedure Review

The inspectors reviewed Temporary Procedure Change Numbers 2552, 2554, 2557, 2562 and 2564 corresponding to procedure QT5-150 - 1 and checklists S1, S4, S2 and S7. With the exception of the following two open items, the inspectors noted that these procedures appeared to be consistent with the requirements of 10 CFR 50, Appendix J and ANSI N45.4 - 1972.

The review of the above procedures revealed the following two items:

- (1) The licensee's procedures referenced a Final Safety Analysis Report containment volume of 275,481 ft³. The containment volume used in the CILRT computer calculations is 288,737 ft³. The inspectors verified that the use of different containment volumes would not adversely affect the Type A, B or C test results. This is considered an open item (265/85018-01(DRS)) pending licensee determination of the correct volume.
- (2) The licensee's procedures do not contain rejection criteria for the rejection of individual sensors during the course of the test. The licensee would have no technical basis to reject an instrument(s) that was providing erroneous readings. No rejectable data was recorded during this Type A test. This is considered an open item (265/85018-02(DRS)) pending inspector review of the revised procedure(s).

b. Summary of Appendix J Requirements

To ensure the licensee's understanding of 10 CFR 50, Appendix J requirements, the following clarification of commonly misinterpreted Appendix J and Regulatory Requirements is provided:

- (1) 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 may be 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 of two valves in series). This assumes no single active failure of redundant leakage barriers. Additionally, any increase in containment sump, reactor water, or suppression pool (torus) 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.

- (2) The Type A test length must be 24 hours or longer to use the mass point method of data reduction. If tests of less than 24 hours are planned, the Bechtel Topical Report BN-TOP 1 must be followed in its entirety except for any Section which conflicts with Appendix J requirements. For either methodology, the acceptance criterion is that the measured leakage at the 95% upper confidence limit must be less than 75% of the maximum allowable leak rate for the pressure at which the test was performed.
- (3) 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 stabilizing within the acceptance criteria, not just 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 of the length of the CILRT.
- (4) An acceptable method for determining if the sum of Type B and C tests exceeds the 0.60 L_a 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 of the better of two leakage barriers in series when performing Type B or C tests.
- (5) Periodic Type A, B and C tests must be performed to determine the as found and as left leakage results. When performing Type B and C test repairs prior to the Type A test, an as found Type A test result must be determined using the as found and as left local leak rate test results. Consistent with your approved exemption from the Office of Nuclear Reactor Regulation, any leakage improvements obtained through the Type B and C test program must be added to the as left Type A test results to obtain an as found Type A test result. The correct method to all local leak test improvements is the "minimum pathway leakage" methodology.

Throughout the performance of the test, the inspectors noted that the licensee appeared to be in compliance with all of the aforementioned clarifications of regulatory requirements.

c. Instrumentation

The inspector reviewed the instrument calibration data associated with performing the CILRT. A multipoint calibration of all instrumentation was performed. Correction values were generated based on the difference between measurements of resistance from an

NBS verified resistance box and actual resistance. The inspectors verified, by performing independent calculations, the accuracy of the licensee correction equations. All corrections were placed as an array or equation into the CILRT computer.

The following instrumentation was used in the CILRT:

<u>Type</u>	<u>Quantity</u>
RTDs	29
Flowmeter	1
Pressure Gauge	2
Dewcells	9

The inspectors performed a pretest containment inspection to ensure the proper placement of test instrumentation and to verify assumptions the licensee was using in regard to temperature survey requirements. The inspectors found the following:

- (1) Several temperature sensors were, in the inspector's opinion, too close to the sacrificial shield and/or structural supports to be representative of their subvolumes. The licensee evaluated and corrected this situation prior to pressurization.
- (2) The licensee had not performed a temperature survey (as required by ANSI N45.4-1972) since their preoperational test. They had deemed the temperature survey requirements of ANSI N45.4-1972 satisfied because of good test results in the past, relatively predictable temperature stratification within containment, and the consistency of temperature readings from temperature sensors in each of their respective subvolumes. The inspector used a digital thermometer and, during the containment inspection, took temperature readings surrounding five temperature sensors to determine if the sensors were truly representative of their subvolume. Based on the result of this impromptu independent survey, the inspector found the assumptions used by the licensee acceptable and determined that the licensee has satisfied the intent of this requirement for the Unit 2 containment. The inspector noted to the licensee that they should perform a temperature survey prior to the next Unit 1 CILRT.

e. Test Witnessing

The licensee began pressurization on May 26, 1985, stabilized and began the measured leakage phase of the CILRT at 3:20 P.M. the same day. The 24 hour test was satisfactorily completed at 3:20 P.M. on May 27, 1985. The licensee then attempted to start the supplemental test by inducing a controlled leak through a flowmeter, but encountered problems with water entering the flowmeter. Since the flowmeter was connected in series with a Reactor Protection System containment pressure sensing line and this line is normally dry, the inspectors

questioned the presence of water in this line. The licensee thought the water came from a general decontamination of the containment inner walls at the beginning of the outage. The decontamination was accomplished by using a high pressure source of water and spraying down the walls, thus introducing water into the sensing line. The licensee committed to the inspectors to check all other atmospheric monitoring lines for water prior to the startup of the unit. Subsequent to this, the inspector verified through conversations with the licensee that they had satisfied this commitment prior to startup of the unit by incorporating the commitment into their startup checklist. The inspector requested the licensee supply the inspector with a copy of the checklist. This is considered an open item (265/85018-03(DRS)) pending inspector review of the startup checklist.

After cleaning the water from the flowmeter, a flow was induced and the supplemental test was completed satisfactorily. After test completion, the licensee depressurized the containment through the Standby Gas Treatment system.

f. CILRT Data Evaluation

The inspector independently monitored and evaluated leak rate data to verify the licensee's calculation of the leak rate. There was acceptable agreement between the inspector's and licensee's leak rate calculations as indicated in the following summary (units are in weight percent per day):

<u>Measurement</u>	<u>Licensee</u>	<u>Inspector</u>
Leakage rate calculated (Lam) during CILRT	0.4083	0.4111
Lam at 95% confidence level	0.4105	0.4132
Lam at 95% confidence level adjusted to reflect penalties (refer to Paragraph 4.h)	0.5473	0.5500

Appendix J Acceptance Criterion at 95% confidence level = $0.75 L_a = 0.75 (1.0) = 0.75$. As indicated above, the adjusted Lam at the 95% confidence level was less than the Appendix J acceptance criterion.

g. Supplemental Test Data Evaluation

After satisfactory completion of the 24 hour test on May 27, 1985, a known leakage of 0.950 weight percent/day was induced. The inspector independently monitored and evaluated leak rate data to verify the licensee's calculation of the supplemental leak rate. There was acceptable agreement between the inspector's and licensee's leak rate calculations as indicated in the following summary (units are in weight percent per day):

<u>Measurement</u>	<u>Licensee</u>	<u>Inspector</u>
Calculated leakage (Lc) rate during supplemental test	1.2126	1.2151

Induced leakage rate (Lo) = 7.75 SCFM = 0.950 wt %/day

Appendix J Acceptance Criterion: $Lo - Lam - 0.25La < Lc < Lo + Lam + 0.25La$ ($1.11 < Lc < 1.61$). As indicated above, the supplemental test results satisfied the requirements of 10 CFR Part 50, Appendix J.

h. CILRT Valve Lineup Penalties

Due to valve configurations which deviated from the ideal penetration valve lineup requirements for the CILRT, the following penalties must be added using the minimum pathway leakage method:

<u>System</u>	<u>Leakage Penalty (Weight Percent/Day)</u>
'A' Reactor Feedwater	0.022
'B' Reactor Feedwater	0.011
'A' RHR	0.049
'B' RHR	0.026
ACAD CAM	0.003
HPCI	0.0258
Total	=0.1368 Wt %/day

i. Summary

Throughout the performance of the Type A test, the inspectors noted evidence of thorough preplanning and conscientious execution on the part of station personnel.

No violations or deviations were identified.

5. Review of Technical Specifications

The inspector reviewed the Quad Cities Technical Specifications for conformance with 10 CFR 50, Appendix J requirements and NRC policy regarding Type A, B and C testing. Technical Specifications Section 4.7.A.2.C Paragraph 3 states "the quantity of gas injected into the containment or bled from the containment during the supplemental test to be equivalent to at least 25 percent of the total measured leakage at Pa."

This Technical Specification does not conform with the requirements of ANSI N45.4-1972 and is not consistent with the NRC position that the quantity of gas injected or bled from containment be between 0.75 and 1.25 La (6.12 and 10.20 SCFM). The inspector will forward this information to NRR for their review and correction of the Quad Cities Technical Specifications.

No violations or deviations were identified.

6. Local Leak Rate Program and Test Procedure Review

The inspectors reviewed past and present local leak rate test results to determine the adequacy of past licensee corrective action related to excessively leaking containment isolation valves. The inspectors noted that the licensee has exceeded the Technical Specification limit of 0.6 La for penetration and isolation valve leakage every outage since the initial unit startup. The following valves/penetrations appeared to be consistently failing their local leak rate tests:

- a. Main Steam Isolation Valves
- b. Feedwater Check Valves
- c. Main Steam Drains
- d. RHR Suppression Chamber Spray
- e. RCIC Steam Supply
- f. RCIC/HPCI Steam Exhaust
- g. Drywell and Suppression Chamber Purge and Vent
- h. O₂ Analyzer Suction

The inspector noted to the licensee that 10 CFR Part 50, Appendix B, Criterion XVI requires that, "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition."

The consistent violation of the 0.6 La limit for penetration and isolation valve leakage and the consistent failure of specific containment isolation valves may be indicative of inadequate corrective action taken by the licensee. In order to resolve this matter, the licensee is requested to submit a list of isolation valves that are consistently failing their local leak rate tests, a summary of the corrective actions taken to correct the failures and current plans to preclude the continuing failures of these valves. Review of this information relative to the adequacy of past and planned corrective action will be tracked as an unresolved item (265/85018-04(DRS)).

Additional inspection effort was expended in the Region III office to review the adequacy of the licensee's local leak rate test procedures QTS 100-0 through QTS 100-46. The procedures, while having some minor inconsistencies, appeared to be acceptable and accomplished local leak rate testing in accordance with regulatory requirements. The licensee stated that the procedures could be revised in the near future to eliminate the aforementioned inconsistencies. When the procedures are revised, the inspectors recommend that the licensee include an isometric or sketch of the penetration and valves involved with the performance of each local leak rate test.

No violations or deviations were identified.

7. As Found Condition of CILRT Results

The as found condition is the condition of the containment at the beginning of the outage prior to any repairs or adjustments (RAs) to the containment boundary. If RAs are made to the containment boundary prior to the Type A test, local leak rate tests must be performed to determine the leakage rates before and after the RAs. The as found Type A test result can then be obtained by adding the difference between the affected path leakages before and after RAs to the overall Type A test results.

The inspector reviewed as found and as left local leak rate test results to determine an as found Type A test result. The following is a summary of the as found containment leak rate (units are in weight percent/day):

Measurement

Penalties incurred due to repairs or adjustments prior to the CILRT	0.4547
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As Found Type A test results:	1.0020
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Appendix J acceptance criteria for the as found condition of the containment = $0.75 \text{ La} = 0.75 \text{ wt \% / day}$.

As indicated above, the as found condition exceeded that allowable by 10 CFR 50, Appendix J. This excessive as found condition was largely due to leakage through the drywell purge penetrations. The CILRT performed in 1984 also exceeded the as found Appendix J limit due to the nonquantification of a repaired containment leak path. As two consecutive as found conditions have failed to meet the acceptance criteria in 10 CFR 50, Appendix J, and as required by Section III.A.6.(b) of 10 CFR 50 Appendix J, the next Type A test shall be performed at the next plant shutdown for refueling unless exempted by the NRC.

No violations or deviations were identified.

8. Independent Inspection

During a tour of the Reactor Building the inspectors found six (6) safety-related Atmospheric Containment Atmosphere Dilution (ACAD) pressure transmitters modified with external calibration jacks. The transmitter instrument numbers are:

2-2541-008A	2-2541-008B
2-2541-011A	2-2541-011B
2-2541-012A	2-2541-012B

Installed in the unused electrical connector port was a plastic plug containing pin jacks wired across a one (1) ohm resistor. The resistor is connected in series with one power lead and develops the millivolt signal used during transmitter calibration.

The inspector requested the records of this design modification for review purposes. The records could not be produced by the licensee.

10 CFR 50, Appendix B, Criteria III subjects all field changes affecting quality to the same review and control requirements applied to the original design and requires approval by the responsible organization. The licensee modified the original plant design without maintaining approved quality records as required by 10 CFR 50, Appendix B, Criterion XVII to demonstrate compliance with 10 CFR 50, Appendix B, Criterion III. This is a violation of 10 CFR 50, Appendix B, Criteria XVII and III (265/85018-05(DRS)).

The licensee should identify any other design changes of this type and ensure they are reviewed and properly documented.

No other violations or deviations were identified.

9. 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 this inspection are discussed in Paragraphs 4.a and 4.e.

10. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. An unresolved item disclosed during the inspection is discussed in Paragraph 6.

11. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on May 28, 1985, and summarized the scope and findings of the inspection activities. The licensee acknowledged the inspector's statements. The inspector discussed the likely informational content of the inspection report with regard to documents reviewed by the inspector during the inspection. The licensee did not identify any such documents as proprietary. Additional inspection effort was expended in the Region III office evaluating the information discussed in Paragraphs 6, 7 and 8 which had required information not available prior to the May 25 exit interview. A teleconference was held on June 24, 1985 between the inspectors and the licensee to further discuss the findings identified during the inspection and to finalize the inspectors' review of the additional information provided by the licensee.