

POOR ORIGINAL

U. S. ATOMIC ENERGY COMMISSION
DIRECTORATE OF REGULATORY OPERATIONS
REGION I

RO Inspection Report No.: 50-289/74-12 Docket No.: 50-289
Licensee: Metropolitan Edison Company License No.: CPPR-40
P. O. Box 542 Priority: _____
Reading, Pennsylvania 19603 Category: B
Three Mile Island Unit 1
Location: Middletown, Dauphin County, Pennsylvania

Type of Licensee: PWR, 871 MWe (B&W)
Type of Inspection: Routine, unannounced
Dates of Inspection: March 10-12, 14, 18-20, 22-23, 1974
Dates of Previous Inspection: March 7-9, 1974

Reporting Inspector: *J. Streeter*
J. Streeter, Reactor Inspector

4/11/74
Date

Accompanying Inspectors: None

Date

Date

Other Accompanying Personnel: None

Date

Reviewed By: *E. C. McCabe*
E. C. McCabe, Senior Reactor Inspector,
Reactor Operations Branch

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4/11/74
Date

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SUMMARY OF FINDINGS

Enforcement Action

A. Violations

Contrary to Criterion V, Appendix B, 10 CFR 50, an electrical ground search was conducted, without a completed and approved work authorization, in violation of the Initial Reactor Building Leak Rate Test Procedure (TP 150/3). (Detail 2.d.1.)

Licensee Action on Previously Identified Enforcement Items

Not inspected.

Unusual Occurrences

None identified.

Other Significant Findings

A. Current Findings

1. The first attempt to conduct the Initial Reactor Building Leak Rate Test (ILRT) commenced on March 10, 1974, and was aborted on March 14, 1974, due to excessive leakage. (Detail 2)
2. The second ILRT attempt commenced on March 18, 1974, and was satisfactorily completed on March 23, 1974. (Detail 2)
3. The ILRT procedure was amended, prior to test conduct, to make it consistent with the Appendix J, 10 CFR 50, requirement relating to the peak test pressure leakage rate acceptance criterion. (Detail 7)
4. Twenty-eight exceptions and six deficiencies were identified and documented by the licensee. (Detail 2.e.)
5. The Type B and C tests were incomplete. (Detail 6)

B. Status of Previously Reported Unresolved Items

The following items, reported as unresolved in Report 50-289/73-09, were reviewed and are now resolved.

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1. Access control. (Detail 3.a.)
2. Instrument calibration. (Detail 3.b.)
3. Shutdown criteria. (Detail 3.c.)
4. System lineups. (Detail 3.d.)

Management Interview

A management interview was conducted at the conclusion of the inspection on March 23, 1974.

Personnel Attending

Metropolitan Edison Company

Mr. J. G. Herbein, Station Superintendent
Mr. J. J. Colitz, Station Engineer
Mr. E. E. Bulmer, Engineer

General Public Utilities Service Corporation

Mr. G. P. Miller, Startup Test Superintendent
Mr. R. J. Toole, Assistant Startup Test Superintendent
Mr. M. J. Stromberg, Site Auditor
Mr. G. Roshy, QA Specialist

The following summarizes items discussed.

A. Inspection Purpose

The inspector stated that the primary purpose of the inspection was to witness the Initial Reactor Building Leak Rate Test (ILRT). The licensee acknowledged this information.

B. Initial Reactor Building Leak Rate Test

The sequence of ILRT events and problems encountered during the test were discussed. (Detail 2)

C. Valves Out of ILRT Position

Violation of the ILRT procedure requirement for control of work in progress during the ILRT was discussed. The licensee acknowledged this information. (Detail 2.d.1.)

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D. Current Findings

The following current findings were discussed. In each case the licensee acknowledged the information.

1. The first attempt to conduct the Initial Reactor Building Leak Rate Test (ILRT) commenced on March 10, 1974, and was aborted on March 14, 1974 due to excessive leakage. (Detail 2)
2. The second ILRT attempt commenced on March 18, 1974, and was satisfactorily completed on March 23, 1974. (Detail 2)
3. The ILRT procedure was amended to make it consistent with the Appendix J, 10 CFR 50, requirement relating to the peak test pressure leak rate acceptance criterion. (Detail 7)
4. Twenty-eight exceptions and six deficiencies were identified and documented by the licensee. (Detail 2.e.)
5. The Type B and C tests were incomplete. (Detail 6)

E. Unresolved Items Now Resolved

The following items reported as unresolved in Report 50-289/73-09 were identified as resolved. In each case the licensee acknowledged the information.

1. Access control (Detail 3.a.)
2. Instrument calibration. (Detail 3.b.)
3. Shutdown criteria. (Detail, 3.c.)
4. System lineups. (Detail 3.d.)

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DETAILS

1. Persons Contacted on Site

Metropolitan Edison Company

Mr. R. Bensel, Engineer
Mr. E. E. Bulmer, Engineer
Mr. J. J. Colitz, Station Engineer
Mr. W. Cotter, Engineer
Mr. R. Harper, I&C Foreman
Mr. J. G. Herbein, Station Superintendent
Mr. C. Randolph, Engineer
Mr. D. Weaver, I&C Foreman
Mr. J. R. Smith, Shift Foreman

General Public Utilities Service Corporation

Mr. J. J. Barton, Test Manager
Mr. R. Claussen, Engineer
Mr. W. T. Gunn, Project Site Manager
Mr. R. W. Heward, Project Manager
Mr. G. P. Miller, Startup Test Superintendent
Mr. M. A. Nelson, Technical Engineer
Mr. J. P. O'Hanlon, Nuclear Engineer
Mr. G. Roshy, QA Specialist
Mr. M. J. Stromberg, Site Auditor
Mr. R. J. Toole, Assistant Startup Test Superintendent

Gilbert Associates, Incorporated

Mr. R. Ely, Computer Specialist
Mr. R. Rogers, Engineer
Mr. W. Sommer, ILRT Shift Test Director

Stearns-Roger Corporation

Mr. W. Bateman, ILRT Shift Test Director

Nuclear Energy Liability Insurance Association

Mr. M. B. Weinstein, Staff Nuclear Engineer

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2. Conduct of the Initial Reactor Building Leak Rate Test

a. General

Initial pressurization of the reactor building commenced at 10:00 P.M. on March 10, 1974. After stabilizing and holding at reduced test pressure for 15 hours, the calculated leakage rate was 0.132% (weight)/day. The acceptance criterion at this pressure is 0.055% weight/day. Unsuccessful attempts to reduce the leakage rate below the acceptance criterion led to a licensee decision at 9:40 P.M., March 14, 1974, to abort the test. Pressurization to about 45 psig was then commenced to aid in locating leaks. Depressurization of the reactor building was commenced at 7:35 P.M. on March 15, 1974.

Upon completion of measures to reduce the leakage rate, the ILRT was resumed at 2:50 A.M. on March 18, 1974. Final depressurization began at 6:10 A.M., March 23, 1974.

b. Test Event Sequence

Commenced initial pressurization.	10:00 P.M.	March 10
Reactor Building at about 30.1 psig.	11:00 A.M.	March 11
Reactor Building atmosphere stabilized, commenced reduced test pressure (Pt) leakage rate test.	4:00 P.M.	March 11
Test aborted. Commenced pressurization to about 45 psig to search for leakage paths.	9:40 P.M.	March 14
Reactor Building at about 45 psig.	9:00 A.M.	March 15
Commenced depressurization to correct excessive leakage.	7:35 P.M.	March 15
Reactor Building at about 14 psig, survey team entered building to search for leaks.	2:00 A.M.	March 16
Reactor Building internal leak survey completed, continued depressurization.	4:00 A.M.	March 16
Reactor Building at 0 psig.	9:00 A.M.	March 16
Commenced pressurization.	2:50 A.M.	March 18
Reactor Building at about 30.1 psig.	8:30 P.M.	March 18
Reactor Building atmosphere stabilized, commenced reduced test pressure (Pt) leakage rate test.	8:00 A.M.	March 19
Pt leakage rate test completed.	8:00 A.M.	March 20
Superimposed leakage rate established.	10:00 A.M.	March 20
Pt superimposed leakage rate test completed.	10:00 P.M.	March 20
Commenced pressurization to about 55.1 psig.	11:55 P.M.	March 20
Reactor Building at about 55.1 psig.	11:00 A.M.	March 21

Reactor Building atmosphere stabilized, commenced peak test pressure (Pa) leakage rate test.	5:00 P.M. March 21
Pa leakage rate test completed.	5:00 P.M. March 22
Superimposed leakage rate established.	5:30 P.M. March 22
Pa superimposed leakage rate test completed.	6:00 A.M. March 23
Commenced depressurization.	6:10 A.M. March 23

c. Test Results

The Initial Reactor Building Leak Rate Test, as conducted by the licensee, indicated satisfactory leakage rates of 0.027% (weight)/day [acceptance criterion = $0.75 L_t = 0.055\%$ (weight)/day] at reduced test pressure Pt (30.1 psig) and 0.051% (weight)/day [acceptance criterion = $0.75 L_a = 0.075\%$ (weight)/day] at peak test pressure Pa (55.1 psig).

While at about 30 psig during the first and unsuccessful ILRT attempt, a test was conducted to experimentally determine the free volume of the Reactor Building. With the Core Flood Tanks initially isolated from the Reactor Building atmosphere and at about 1 psig, the tanks were vented to the Reactor Building. Data was taken before and after CF tank equalization and the Reactor Building free volume calculated. The free volume determined by this test was 2.24×10^6 cubic feet. The theoretical value used in the leakage rate calculations was 2.0×10^6 cubic feet. There were no acceptance criteria established for this test since it was conducted for information only.

d. Problems Encountered

During the ILRT, problems were encountered with valves being out of position and with excessive leakage through the Reactor Building purge supply valves, fuel transfer tubes, personnel air lock inner door, emergency cooling coils of Reactor Building air recirculation units A and C, and with steam generator manway and handhole covers. Also, about four hours of data had to be discarded due to an RTD bridge not being zeroed. Each of these problems is addressed individually below.

1) Valves Out of ILRT Position

Unsatisfactory leakage rate results for the first fifteen hours of the initial ILRT attempt prompted the licensee to search for leakage paths and to recheck the ILRT valve alignment. Seven valves were found to be out of position.

The valves were placed in the position called for in the ILRT procedure and the test was continued.

The licensee determined that a D.C. ground search, conducted after the commencement of the ILRT, resulted in the opening of six of the valves when their control circuits were de-energized. The licensee evaluated the seventh valve as opened to obtain a reactor coolant sample and inadvertently left open. The inspector asked if a work authorization was issued for the ground search and was informed by the licensee that troubleshooting for the ground was undertaken without a completed and approved authorization. The inspector stated that this was contrary to Section 6.6 of the ILRT procedure which states "Extent of any work in progress on Unit 1 while this test is being conducted will be controlled by United Engineers and Constructors and Metropolitan Edison Company. Work authorizations will be reviewed accordingly." The ground search activity, as conducted, thereby violated the requirement of Criterion V, Appendix B, 10 CFR 50, that activities be performed in accordance with prescribed instructions or procedures.

2) Reactor Building Purge Supply Valves

During the initial ILRT attempt, the pressure in the inter-space between the Reactor Building purge supply valves was following the building pressure. When the ILRT Pt leakage rate was evaluated after valve alignment verification and found to be in excess of the acceptance criterion, the purge supply valves (AH-V-1D and AH-V-1C) were suspected by the licensee as being the primary contributors to the excessive leakage rate. The licensee sealed the outer surface of the outboard supply valve with duct sealer, continued the ILRT, and stated that he would repair the valves immediately after the ILRT. The inspector concurred with the licensee's action subject to the licensee removing the sealer at Pt and Pa and determining the change in leakage rates over a period of 6 hours. The inspector also stated that the Type C test results for the valves after repairs would have to be added to the Type A results to arrive at a final adjusted A value. The licensee agreed to these conditions.

Subsequent unsatisfactory leakage rate data resulted in the licensee aborting the ILRT and making repairs to the purge valves rather than conducting the test with the seat sealer in place. The leakage was corrected by adjusting the actuator limit switch on the inboard (AH-V-1C) valve so that it con-

sistently closed to the same position and by removing paint found on the outboard (AH-V-1D) valve seating surface. Also, the outboard (AH-V-1B) exhaust valve was found to have several high spots on the rubber seat and these were removed. These valves were satisfactorily Type C tested after repairs and the test of the supply valves was witnessed by the inspector. The licensee stated that a description of the repairs made to these valves would be included in the final summary report submitted to the Directorate of Licensing. The inspector had no further questions concerning this matter.

3) Fuel Transfer Tubes

Leaks were located on the flanged closures of the fuel transfer tubes inside the Reactor Building. Several flange bolts were found missing and were installed. When the flange had been previously torqued without all of the bolts installed, it had cocked. Insertion and torquing of the missing bolts did not correct the cocking. This item was listed as a deficiency to the ILRT and the licensee stated that this deficiency will be corrected after fuel loading but prior to operation. The licensee stated that a work order would be issued for correctly torquing the flanged closures after fuel loading and would include provisions for conducting a Type B test on the flange gaskets. This item is unresolved pending completion of corrective action.

4) Personnel Air Lock Inner Door

Pressure between the personnel air lock doors increased during the first ILRT attempt. It was found, after the initial depressurization, that the Penetration Pressurization line passing through the lock to the Reactor Building had a loose fitting and the line was vented inside the building allowing air to pass from the Reactor Building to the personnel air lock interspace. The fitting was tightened, correcting the problem. The inspector had no further questions concerning this matter.

5) Emergency Cooling Coils of RB Air Recirculation Units

During the first ILRT attempt, the pressure of the emergency cooling coils of Reactor Building Air Recirculation Units A and C increased with building pressure. After depressurizing the building for repairs, the licensee pressurized the cooling coils with water to 60 psig in an attempt to locate the leakage paths. The licensee was unable to determine the leakage paths and

depressurized the coils prior to the second ILRT attempt. This matter was documented by the licensee as a deficiency to the ILRT. This item is unresolved.

6) Steam Generator Manway and Handhole Covers

During the first ILRT attempt, the secondary sides of the steam generators were observed to have an air linkage with the Reactor Building. After the test was aborted, a flow meter was installed on steam lines A and C and the building pressurized from about 30 psig to 45 psig. The flow meter readings increased with building pressure and verified building to secondary system pressure linkage. The steam generators were then filled to about 480" to determine if this affected the leakage. The licensee stated that the result of filling the steam generators was inconclusive due to the flow meters reading inaccurately with the moisture in the leaking air. The steam generators remained at 480" throughout the remainder of the ILRT.

After depressurizing the Reactor Building on March 16, all manway and handhole covers on the steam generators were retorqued. When the ILRT was resumed it was found that communication between the Reactor Building and the secondary system was corrected in Steam Generator A but still existed in Steam Generator B. The B generator reached a maximum of about 8 psig while the building was at about 55 psig.

The licensee stated that a description of the status of the secondary system during the conduct of the ILRT would be included in the final summary report. The inspector had no further questions concerning this matter.

7) RTD Bridge

During the second ILRT attempt, the licensee found after four hours had elapsed in the Pt test that one bridge used to measure the Reactor Building temperature sensors (RTDs) was giving much higher values than the other two bridges. The licensee determined the cause to be that the operator was not zeroing the bridge before taking data. The licensee instructed the operators to zero the bridges before taking data each time. The licensee again began the Pt test. The inspector witnessed the taking of several sets of data and had no further questions concerning this matter.

e. Test Exceptions and Deficiencies

The inspector reviewed 34 exceptions and deficiencies to the ILRT procedure. All but two of these had been justified (exceptions) or resolved (deficiencies) prior to completion of the inspection. The two outstanding deficiencies relate to the flanged closures of the fuel transfer tubes and to the emergency cooling coils of Reactor Building Air Recirculation Units A and C. These items are discussed in Details, 2.d.3. and 2.d.5., preceding.

3. ILRT Procedure Review

The initial review by RO:I of the ILRT procedure (TP 150/3) indicated that revisions to the procedure were necessary. The licensee's actions to respond to areas of concern were reviewed by the inspector as indicated below.

a. Access Control

The inspector reviewed the licensee's program to control access to areas under pressure. The program included issuing and posting manning requirements and issuing authorized access lists to guards stationed at points around the Reactor Building. This concern, documented in Report 50-289/73-09, Detail 3.g., is resolved.

b. Instrument Calibration

The inspector examined the ILRT test instrumentation for current calibration stickers and verified that calibration records were available to confirm the sticker dates and that the calibration dates were within 30 days of test commencement. This concern, documented in Report 50-289/73-09, Detail 3.i., is resolved.

c. Shutdown Criteria

The inspector reviewed the ILRT procedure for immediate shutdown provisions and found that the licensee had revised the procedure to include unusual conditions when the Reactor Building should be depressurized. Examples of such conditions included a ruptured line or unexpected building pressure increase of 1 psig. This concern, documented in Report 50-289/73-09, Detail 4.b.1., is resolved.

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d. System Lineups

The inspector reviewed the system lineups for the ILRT and the exceptions to these lineups against 10 CFR 50, Appendix J and FSAR requirements. This concern, documented in Report 50-289/09, Detail 6., is resolved.

4. Reactor Building Normal Cooling Inlet Valve

After reviewing the licensee's proposed Type C testing program, the Directorate of Licensing informed the licensee, on January 15, 1974, that an automatic isolation valve would have to be added in the Reactor Building normal cooling coil inlet line. The valve (RB-V2*) has been installed and the installation was visually verified by the inspector. The valve will be Type C tested after the normal operator is installed and is included in the listing of valves to be Type C tested in Detail 6.a. of this report.

5. Quality Assurance Audits

The licensee developed and implemented a test inspection plan for the surveillance and auditing of the ILRT. The test inspection plan included QA inspection of the following items:

- a. Test manning documents.
- b. "Official Field Copy" of TP 150/3.
- c. Test prerequisites.
- d. Instrument calibration.
- e. Exclusion areas.
- f. Valve lineups.
- g. Log books.
- h. Briefing sheets.
- i. Data taking.

The inspector witnessed the QA inspectors' performance and examined surveillance and audit notes. The inspector found no deficiencies and had no further questions concerning this matter.

6. Status of Type B and C Testing

The licensee documented, prior to the ILRT, the summation of local leak rates for Type B and C tests.

a. Type C Status (Isolation Valves)

Summations	=	2,614 cc/min	=	0.66 La
Acceptance Criterion	=	7,865 cc/min	=	0.2 La

Additions to this figure will be determined after completion of Type C tests. Type C tests remain to be conducted or rerun on 13 valves. Ten of the 13 valves yet to be tested or retested are in the Makeup and Purification System. Test results of MU-V107A, B, C, and D indicate greater than 12,000 cc/min leakage through each of these valves. The licensee stated that these valves would be repaired and all Type C testing completed by April 6, 1974. The licensee also stated that, if the 10 CFR 50, Appendix J acceptance criterion of 0.6 La for the sum of Type B and C test results could not be met after the valve repairs, he intends to apply to the Directorate of Licensing for a variance for MU-V107A, B, C, and D.

b. Type B Status (Penetrations)

The licensee stated that almost all of the penetrations to be Type B tested remain to be tested or retested and that this testing would be completed by April 6, 1974.

The inspector stated that the Type B and C tests would have to be completed prior to plant operation, unless a variance is granted by the Directorate of Licensing, so that compliance with the acceptance criterion of Appendix J could be demonstrated. This item is unresolved.

7. Pa Leakage Rate Acceptance Criterion

The inspector stated that the licensee's acceptance criterion for the calculated leakage rate at peak test pressure was contrary to Appendix J. The licensee's acceptance criterion was equal to La whereas the Appendix J acceptance criterion is 0.75 La. The licensee revised the ILRT procedure acceptance criterion to comply with Appendix J. The inspector had no further questions concerning this matter.

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8. ILRT Log Book

The inspector informed the licensee that ANSI N45.4-1972 states that "... a dated log of events and pertinent observations shall also be maintained during the test." The inspector stated that the logs of the control room and the Shift Test Engineer could satisfy the log book requirement if they provided an accurate description of ILRT test activities. Upon reviewing these logs immediately after commencement of the test, the inspector stated that these logs did not adequately describe the ILRT test activities. The licensee initiated an ILRT Log and instructed the ILRT Test Directors to log all pertinent events and observations. Subsequent inspector review of these logs revealed no deficiencies and the inspector had no further questions concerning this matter.