

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
REGION I

IE Inspection Report No: 50-286/75-01 Docket No: 50-286

Licensee: Consolidated Edison Company of New York, Inc. License No: CPPR-62

4 Irving Place Priority: _____

New York, New York Category: B1

Location: Indian Point 3, Buchanan, New York Safeguards Group: _____

Type of Licensee: PWR, 965 MWe (Westinghouse)

Type of Inspection: Routine, Announced

Dates of Inspection: January 5-12, 19-20, 1975

Dates of Previous Inspection: December 30-31, 1974

Reporting Inspector: T. Rebelowski
T. Rebelowski, Reactor Inspector

2/13/75
Date

Accompanying Inspectors: None

Date

Date

Date

Date

Other Accompanying Personnel: _____

Date

Reviewed By: E. C. McCabe, Jr.
E. C. McCabe, Senior Reactor Inspector
Nuclear Support Section, Reactor Operation Branch

2/13/75
Date

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SUMMARY OF FINDINGS

Enforcement Action

None

Licensee Action on Previously Identified Enforcement Items

Not Inspected

Design Change

Not Inspected

Unusual Occurrences

None

Other Significant Findings

A. Current Findings

1. Acceptable Areas

No inadequacies were identified with the following.

a. Prerequisites

The licensee's preparation for the performance of the Vapor Containment Leakage Test was observed. (Detail 4)

2. Unresolved Items

a. Test Results

The calculated leakage rate, uncorrected, was 0.0236 weight percent per day at P_a (41 psig). The confidence limits established by the licensee from data collected did not fall below L_a or 0.1 weight percent per day. (Detail 5a)

b. Containment Air Recirculation Fans (CARF)

The containment air recirculation fans experienced inadvertent trips while running in a pressurized containment atmosphere. (Detail 5b(2))

B. Status of Previous Unresolved Items

1. The following items from Inspection Report 50-286/74-26 are resolved. (Detail 6)
 - a. Temperature Surveys
 - b. Gas Cylinder Removal
 - c. Test Pressure
 - d. Instrumentation Failure Criteria
 - e. Stabilization Period
 - f. Peak Pressure Acceptance Criteria
 - g. Additional Formulae
 - h. Test Procedure Approval
 - i. Pressure Increments
 - j. Organizational Structure
 - k. Data Sheets
 - l. Temperature Measurement.
 - m. Areas of Survey
 - n. Crack Width Determination
 - o. InVar Wires
 - p. Unexpected Pressure Drops

2. The following items were resolved prior to the conclusion of testing and are referenced in Inspection Report 50-286/74-26. (Detail 7)
 - a. Pressure Sources
 - b. External System Control
 - c. Instrumentation Calibration
 - d. Seal Water Isolation
 - e. Local Leak Rate Test Stand
 - f. Listing of Penetrations
 - g. Access Control
 - h. Interference Areas
 - i. Correction of ILRT Results
 - j. Service Water Isolation Valve Leakage.

Management Interview

A management interview was held at the site on January 10 and 20, 1975.

Persons Present

Mr. Cantone, Chief Engineer, Indian Point 3
Mr. Josiger, Test Engineer, Con. Edison

Items Discussed

A. Purpose of the Inspection

The inspector stated that the purpose of the inspection was to review previous unresolved items and witness the preparation for performance and the testing of the Containment Leakage Test.

B. Review of Previously Unresolved Items

The inspector stated that a number of unresolved items in Inspection Report 50-286/74-26 were resolved. (Details 6 and 7)

C. Containment Air Recirculating Fans

The inspector stated that the containment air recirculating fans experienced trips due to overloads during the leakage rate test.

The licensee stated that a review was in progress to determine his action to correct the problem. (Detail 5b(2))

D. Leakage Rate Test Results

The inspector stated that his observations of data accumulation sheets for the determination of leakage rates at 41 psig noted that licensee's calculated leakage rates exceeded maximum allowable 95% confidence level leakage criteria. (Detail 5a)

Other items that were discussed with licensee and remain unresolved are described in Detail 8 of this report.

DETAILS

1. Persons Contacted

Consolidated Edison Co.

Mr. R. Allen, Reactor Operator
Mr. J. Baronski, Shift Supervisor, Indian Point, Unit 3
Mr. S. Cantone, Chief Engineer-Indian Point, Unit 3
Mr. C. Caputo, Asso. Engineer-Test
Mr. G. Coulbourn, Manager, Indian Point 3, Construction
Mr. R. Desmaris, Reactor Operator
Mr. W. Josiger, Test Engineer
Mr. K. O'Connor, Associate Engineer
Mr. V. Perry, Supt. Field Operations
Mr. F. Smutry, Reactor Operator
Mr. Uhl. Test Engineer
Mr. Zullo, Operations Engineer Indian Point 3

WEDCO

Mr. R. Murphy, Security Guard
Mr. C. Walker, Test Director
Mr. T. Wordle, Test Director
Mr. T. Van Witbeck, Test Director
Mr. A. Xaxier, Civil Engineer

Wiss, Janney Elstner and Associates

Mr. T. Brown, Director Power Division Services
Mr. G. Hedien, Engineering Technician
Mr. B. Krause, Asst. Director of Power Engineering Services

U. E. & C.

Mr. B. Scott, Structural Engineer
Mr. R. Yisheny, Structural Engineer

Stone & Webster. (Consultants to PANSY)

Mr. C. Code, Observer, Engineer
Mr. R. Levy, Observer, Engineer

2. General

The licensee conducted the procedure INT TP 4.11.9, Vapor Containment Structural Integrity Test and Leakage Rate Test from Jan 12-20, 1975.

The licensee's results uncorrected for the instrument error and the 95% confidence limit were:

At > 21psig = 0.002 weight percent per day;
At > 41psig = 0.0236 weight percent per day.

3. Conduct of Vapor Containment Leakage Test

A. The inspector observed testing preparations from January 6-12, 1975 during inspection 50-286/75-02, a preoperations test procedural review. On January 19-20 the inspector witnessed a portion of the leakage test at accident pressure, 41psig, and the verification test and depressurization of containment. The following items were noted.

- (1) The licensee conducted the test with the appropriate revision of the procedure at the test control center. (drumming station)
- (2) Under the guidance of the Test Director, WEDCO Test Supervisors, the licensee's Startup Engineers and Structural Consultants; the Electrical and Mechanical Test Technicians recorded all data required to perform the test calculations.
- (3) The inspector reviewed a sampling of the prerequisites required for testing and found them completed.
- (4) The Containment Recirculation fans were in operation to stabilize containment temperatures.
- (5) Special data collection instrumentation to collect structural data, digital pressure instrumentations and dewcels and RTD's were rechecked prior to testing and were found acceptable.
- (6) Test was performed as required by procedure. Changes to the procedure were documented.
- (7) The test groups were knowledgeable regarding the test procedure, and the test notes in the event log described problems encountered during testing.

- (8) The licensee's final analysis of test data will appear in the test report to the Office of Nuclear Reactor Regulation, Division of Reactor Licensing. The inspector's preliminary review indicates that uncorrected calculated leak rates, including the 95% confidence interval, do not fall below the allowable leakage rate.
- (9) The licensee plotted addition graphs of Total Time leakage and Point to Point Leakage, and Temperature-Pressure Relationships to aid in his data analysis.

4. Preparation for Performance of TP 4.11.9

a. Instrument Calibration

The Inspector verified that instrumentation used to monitor the SIT and ILRT were calibrated with test equipment traceable to the National Bureau of Standards.

The Inspector noted that the calibration of the dewcells were not properly documented. The licensee obtained ohmic values of curves from the manufacturer and at site testing was performed at varied temperature levels to verify calibration. The inspector had no further questions on calibration of instrumentation.

b. Installation of InVar Wires

The licensee concluded his installation of INVAR WIRES on Jan. 8, 1975. Monitoring of inputs was continued on a one shift basis prior to SIT commencement. This item is resolved.

c. Temperature Survey of Containment

The licensee conducted a survey of containment atmosphere on Jan. 7, 1975 and Jan. 8, 1975. The containment areas monitored were divided into approximately equal areas and at various levels. A Preliminary review of the data indicated no atmosphere stratification.

Areas near operating motors and areas with minimal circulation (lower levels) did exhibit a 1° - 4°F difference in average temperatures. The inspector had no further questions in this area.

5. Test Results

a) 95% Confidence Limit

The inspector reviewed the licensee's computer outputs on total-time calculated leak rate and indicated to the Test Director that the leakage rate, including the 95% confidence interval established for the data accumulated, exceeded the maximum allowable leakage rate. The licensee's calculations established a 95% confidence limit of ± 0.11 weight per day to be added to the leakage rate result.

The licensee's preliminary leakage rate calculations indicated a leakage rate of 0.0236 weight percent per day.

The inspector stated to the test director that the Inspection and Enforcement Division of NRC had accepted limits meeting the following criteria.

Criteria: The end of test upper 95% confidence limit for the calculated leak rate based on Total-Time calculations shall be less than the maximum allowable leakage rate.

The licensee's data indicates 0.0236 ± 0.11 weight percent per day. An acceptable maximum limit of 0.1 weight percent per day is documented in the FSAR. The inspector expressed his concern to the Test Director prior to conclusion of the P_a test and the Test Director noted the inspector's remarks and did not comment on the inspector's observations. The inspector noted that the range of data scatter noted from licensee graphs and data sheets could be attributed to his methods of controlling containment temperature.

This item is a major unresolved issue which will be brought to the attention of higher NRC management.

b) Problems Encountered During Testing

(1) Containment Penetration Repairs

During the performance of INT-TP 4.11.8, Containment Penetration and Weld Channel Pressurization System, a number of minor areas were repaired at penetrations D, H, O, Q and Y. Retest of these areas was performed prior to Vapor Containment Testing. The inspector had no further questions on this item.

(2) Containment Recirculation Fans

The containment recirculation fans were operated during the Leakage Rate Testing at pressures up to and including 41 psig (P_a). Test procedure INT-TP 4.11.9 requires control of containment temperature during testing at $\pm 0.5^\circ\text{F}$ of initial temperature. This narrow range was imposed by the Architect Engineer (A/E). The requirement for temperature control required use of containment recirculation fans to maintain the temperature requirements.

The recirculating fans were set at 200 amp overload protection. During testing the C.R. fans were subject to repeated trips. The A/E, with vendor permission, raised the overload trips to 300 amps. The C.R. fans operated in an atmosphere of 36 psi.

(5) Subject: Instrument Failures.

Reference = Inspection Report 50-286/74-26, detail 2c.

The licensee addressed instrument failures in paragraph 6.1.7 of the test procedure. The licensee has stated that, during the conduct of the test, if a monitored parameter's sensor is suspect, the sensor reading shall be compared to the average of the previous sensor-readings and an engineering evaluation made to include or exclude the sensor in preliminary data evaluations.

The inspector's discussions with licensee indicated that the licensee was aware of industry standards that have been accepted in this area. (Bechtel Topical Report BN-TOP-1)

The inspector had no further questions on this subject.

6. Previously Unresolved (Open) Items

- a. The inspector reviewed a copy of the approved procedure INT-TP-4.11.9, Vapor Containment Structural Integrity Test and Leakage Rate Test.

(1) Subject: Temperature Surveys.

Reference: Inspection Report 50-285/74-26, detail 2a.

The licensee revised the procedure to include, in Section 6.2.10, the requirement to perform a containment temperature survey and establish any tendencies to regional temperature variations to verify placement of temperature sensors. This item is resolved.

(2) Subject: Gas Cylinder Removal.

Reference: Inspection Report 50-285/74-26, detail 2b.

The licensee stated that a survey of containment included all construction lockers for removal of pressurized gas bottles and a complete survey of welding gas bottle removals. A final survey was made by the licensee prior to closing containment and no additional bottles were identified.

The inspector observed the absence of gas bottles in containment during the January 6, 7 or 8 inspection of containment. This item is resolved.

- (3) Subject: Test Pressure.
Reference: Inspection Report 50-286/74-26, details 2g and 4b.

The licensee revised the procedure to include the criteria of measurement of test pressure by the lowest reading precision pressure instrument. (Paragraph 6.9.4, 6.13.2 and 6.15). These items are resolved.

- (4) Subject: Stabilization Period.
Reference: Inspection Report 50-286/74-26 detail 2h.

- (a) The licensee has addressed, in paragraph 6.1.2, the requirement for stabilization including:

Test start only when the leakage is zero or positive; and

Average containment temperature variation over the previous two hours of 1°F/Hr or less.

- (b) The licensee addressed, in paragraph 6.1.5.7 (at P_t) and paragraph 6.1.5.9 (at P_a), the requirement of four hours of stabilization. The licensee stated that the mass calculations will be computed to provide a trend analysis in place of pressure-Temperature trend analysis. The licensee will record, pressure, temperature data.

The inspector had no further questions on this subject.

- (6) Subject: Peak Pressure LLRT Acceptance.
Reference: Inspection Report 50-286/74-26, detail 2j.

The licensee has revised acceptance criteria for peak pressure test in paragraph 6.16.7 to conform with 10 CFR 50 Appendix J. This item is resolved.

- (7) Subject: Formulas
Reference: Inspection Report 50-286/74-26, detail 2m.

The licensee has revised formulas, in enclosure 3.2, and has added the missing multiplication factor and method of calculation of four variables: L_{tm} , L_{pc} , L_{am} and L_{ac} . This item is resolved.

- (8) Subject: Approved Procedure.
Reference: Inspection Report 50-286/74-26, detail 2n.

The licensee approved the Vapor Containment Structural Integrity Test and Leakage Rate Test on December 31, 1974. This item is resolved.

- (9) Subject: Pressure Increments.
Reference: Inspection Report 50-285/74-26 detail 4a.

The licensee has included a data point at 12 psig decreasing in Paragraph 6.1.5.11 of the revised procedure. The inspector had no further questions on pressure plateau data collection.

- (10) Subject: Organizational Chart.
Reference: Inspection Report 50-286/74-26 Detail 4b.

The licensee has included, in appendix 3.9, a revised organizational chart depicting lines of authority during the conduct of 1LRT and SIT tests. This item is resolved.

- (11) Subject: Data Sheets.
Reference: Inspection Report 50-286/74-26 detail 4c.

The inspector reviewed the licensee consultant's method of recording and documenting data collected from InVar Readings and Crack Pattern Layouts. Data collection was monitored and verified by the inspector during testing. No inadequacies were noted. This item is resolved.

- (12) Subject: Temperature Measurements.
Reference: Inspection Report 50-286/74-26, detail 4d.

The licensee revised paragraph 6.2.1 to require recording of exterior temperatures for 24 hours prior to pressurization. This item is resolved.

- (13) Subject: Areas of Survey
Reference: Inspection Report 50-286/74-26, detail 4f.

The inspector reviewed licensee designation of crack pattern survey points in the following areas.

- 1) Equipment Hatch - $\frac{1}{4}$ quadrant.
- 2) Personal Hatch - $\frac{1}{4}$ quadrant.
- 3) Crack Pattern Layouts at
 - 43'0 to 48'0 azimuth 129°
 - 115'0 to 120'0 azimuth 328°
 - 188'0 to 193'0 azimuth 328°
- 4) 1 selected area at 90' azimuth 245°
(Monitor largest crack)

The survey prior to Vapor Containment test indicated cracks of varying widths. The range of indications was between 0.1" to 0.001". The majority of readings appeared to range from 0.001" to 0.006". The inspector had no further questions concerning areas of survey. This item is resolved.

- (14) Subject: Crack Width Determination.
Reference: Inspection Report 50-286/74-26 Detail 4h.

The licensee has obtained two instruments, a Bausch & Lomb - AB 1533 and pocket comparator. Certification to factory specifications calibrated with standards traceable to National Bureau of Standards. Documentation of calibration was reviewed by the inspector. No deficiencies were noted. This item is resolved.

- (15) Subject: InVar Wires.
Reference: Inspection Report 50-285/74-26 detail 4k.

The Inspector reviewed as-built locations indicated on UE&C drawing. 9321-F-14193-6. The InVar material was determined to be InVar-36 tensile strength 108-111,000 psi. The extension ohmeters were viewed in the areas of the equipment hatch, vertical and radial planes. The areas monitored consist of :

- 15 InVars at Equipment Hatch;
 - 2 InVars Apex to 191' S
- 13 InVars Radials (various elevations):
 - 3 InVars Verticals at 191', 143', 95' to base;
 - 2 InVars Outside Equipment Hatch

Additional test wires for base line data are also installed. The inspector noted no deficiencies. This item is resolved.

- (16) Subject: Unexpected Pressure Drops.
Reference: Inspection Report 50-286/74-26 detail 4m.

The licensee has addressed the requirement to recheck and record structural data at varying pressure ranges if unexpected depressurization occurs. (Paragraphs 6.5.1, 6.7.1 and 6.10.4). No deficiencies were noted. This item is resolved.

7. Additional Items Observed During Testing

The inspector observed and verified completion of the following items.

- (1) Subject: Pressure Sources.
Reference: Inspection Report 50-286/74-26, Detail 2c.

The inspector's survey of containment included a physical check on air lines, instrument air systems and gas cylinders to verify that sources external to the containment were prevented from contributing to the containment mass during testing. This item is resolved.

- (2) Subject: External System Control.
Reference: Inspection Report 50-286/74-26, Detail 2d.

The licensee had revised valve lineups to prevent the insertion of artificial leakage barriers in piping systems extending from containment. Lineups were checked to verify changes. This item is resolved.

- (3) Subject: Instrument Calibration.
Reference: Inspection Report 50-286/74-26 Detail 2f.

The inspector verified that instrumentation used to monitor leakage test parameters were in proper calibration and traceable to the National Bureau of Standards. There was one exception. The dewcels monitoring the vapor pressure were not fully documented. The licensee produced tables of ohmic values certified by N.B.S. at the manufacturer's facilities. On site checks were performed at various temperatures and compared to tables and found acceptable. The inspector had no further questions on calibration.

- (4) Subject: INT-TP 4.11.5 Seal Water Isolation.
Reference: Inspection Report 50-286/74-26, Detail 3c.

The licensee revised the test procedure to remove all N₂ bottles to prevent leakage from the N₂ injection header. This item is resolved.

- (5) Subject: Local Leakage Rate Test Stands.
Reference: Inspection Report 50-286/74-26, detail 3g.

The inspector verified that revision 3 to enclosures 3.2, construction Check List page 6, had been revised to include a test for bypass valve leakage prior to use of Test Stand for "C" and "B" type testing by the influent test method.

The inspector examined data sheets and confirmed that tests were conducted and documented. This item is resolved.

- (6) Subject: Listing of Penetration.
Reference: Inspection Report 50-286/74-26, detail 4c.

The licensee has included, in checkoff lists and the test procedure, available to survey teams, a listing of penetrations. This item is resolved.

- (7) Subject: Access Control.
Reference: Inspection Report 50-286/74-26, detail 4e

The inspector reviewed the Licensee Safety Department's Physical Boundaries specified to preclude ingress to testing areas. During testing, patrolling guards and permanently stationed guards at containment access hatches challenged the inspector's presence in restricted areas. The inspector had no further questions in this area.

- (8) Subject: Interference Areas.
Reference: Inspection Report 50-286/74-26, detail 4g.

The licensee has identified areas to be surveyed with regard to potential interference due to vertical and horizontal expansion during testing. No interferences were recorded during the structural integrity test. This item is resolved.

- (9) Subject: Correction of ILRT Results.
Reference: Inspection Report 50-286/74-26, detail 21.
The licensee agreed to include the total leakage values obtained from "B" and "C" testing of penetration used during the "A" test. These penetrations include lines 864, 865, 866, 867 and 868 as shown on drawing 9321-F-2778B. This item is resolved.

- (10) Subject: Service Water Isolation Valve Leakage Test.
Reference: Inspection Report 50-286/74-26, detail 3d.

The licensee addressed the testing of service water valves in INT-TP-4.11.10, data sheets 29-33. This item is resolved.

8. Unresolved Items

Instrument Error.

Reference: Inspection Report 50-286/74-26. (Detail 2k).

The licensee stated that the requirement to perform an instrumentation error analysis will be accomplished and submitted with the Final Containment Report.

The licensee stated that the application of the instrumentation error will not be factored into the leak rate results.

The inspector stated that this item will be addressed to higher NRC management for resolution. This item is unresolved.