

ATTACHMENT
SUPPLEMENTAL INFORMATION
FOR
PROPOSED TECHNICAL SPECIFICATIONS

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
INDIAN POINT UNIT NO. 2
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4.4 CONTAINMENT TESTS

Applicability

Applies to containment leakage.

Objective

To verify that potential leakage from the containment is maintained within acceptable values.

Specifications

A. INTEGRATED LEAKAGE RATE

1. Test

- a. A full-pressure integrated leakage rate test shall be performed at intervals specified in Specification 4.4.A.3 at the peak accident pressure (P_a) of 47 psig minimum.
- b. The integrated leakage rate test shall be performed in accordance with 10 CFR 50 Appendix J, Option B, as modified by approved exemptions and in accordance with guidelines contained in Regulatory Guide 1.163, dated September 1995.
- c. A test duration shall be used in accordance with 10 CFR 50 Appendix J, Option B, as modified by approved exemptions and in accordance with guidelines contained in Regulatory Guide 1.163, dated September 1995.
- d. A general inspection of the accessible interior and exterior surfaces of the containment structures and components shall be performed prior to performing an integrated leak test to uncover any evidence of structural deterioration which may affect either the containment structural integrity or leak tightness. If there is evidence of structural deterioration, integrated leakage rate tests shall not be performed until corrective action is taken. Such structural deterioration and corrective actions taken shall be reported as part of the test report.

- e. Closing of the containment isolation valves for the purpose of the test shall be accomplished by the means provided for normal operation of the valves.

2. Acceptance Criteria

The As Found measured leakage rate shall be less than $1.0 L_a$ where L_a is equal to 0.1 w/o per day of containment steam air atmosphere at 47 psig and 271°F, which are the peak accident pressure and temperature conditions. Prior to entering a mode where containment integrity is required, the As Left leakage rate shall not exceed $0.75 L_a$.

3. Frequency

The integrated leakage rate test frequency shall be performed in accordance with 10 CFR 50 Appendix J, Option B as modified by approved exemptions and in accordance with guidelines contained in Regulatory Guide 1.163, dated September 1995.

B. SENSITIVE LEAKAGE RATE

1. Test

A sensitive leakage rate test shall be conducted with the containment penetrations, weld channels, and certain double-gasketed seals and isolation valve interspaces at a minimum pressure of 52 psig and with the containment building at atmospheric pressure.

2. Acceptance Criteria

The test shall be considered satisfactory if the leak rate for the containment penetrations, weld channel and other pressurized zones is equal to or less than 0.2% of the containment free volume per day.

3. Frequency

A sensitive leakage rate test shall be performed at every Refueling Interval (R#).

C. AIR LOCK TESTS

1. The containment air locks shall be tested at a minimum pressure of 47 psig. The test shall be performed in accordance with 10 CFR 50 Appendix J, Option B, as modified by approved exemptions and in accordance with guidelines contained in Regulatory Guide 1.163, dated September 1995. The acceptance criteria is included in Specification 4.4.D.2.a.
2. Whenever containment integrity is required, verification shall be made of proper repressurization to at least 47 psig of the double-gasket air lock door seal upon closing an air lock door.

D. CONTAINMENT ISOLATION VALVES

1. Tests and Frequency

- a. All isolation valves in Table 4.4-1 shall be tested for operability in accordance with 10 CFR 50 Appendix J, Option B, as modified by approved exemptions and in accordance with guidelines contained in Regulatory Guide 1.163, dated September 1995.
- b. Isolation valves in Table 4.4-1 which are pressurized by the Weld Channel and Containment Penetration Pressurization System are leakage tested as part of the Sensitive Leakage Rate Test included in Specification 4.4.B.
- c. Isolation valves in Table 4.4-1 which are pressurized by the Isolation Valve Seal Water System shall be tested at every refueling but in no case at intervals greater than 2 years as part of an overall Isolation Valve Seal Water System Test.
- d. Isolation valves in Table 4.4-1 shall be tested with the medium and at the pressure specified therein.

2. Acceptance Criteria

- a. The combined leakage rate for the following shall be less than $0.6 L_a$: isolation valves listed in Table 4.4-1 subject to gas or nitrogen pressurization testing, air lock testing as specified in Specification 4.4.C.1, portions of the sensitive leakage rate test described in

Specification 4.4.B.1 which pertain to containment penetrations and double-gasketed seals.

- b. The leakage rate into containment for the isolation valves sealed with the service water system shall not exceed 0.36 gpm per fan cooler.
 - c. The leakage rate for the Isolation Valve Seal Water System shall not exceed 14,700 cc/hr.
3. Containment isolation valves may be added to plant systems without prior license amendment to Table 4.4-1 provided that a revision to this table is included in a subsequent license amendment application.

E. CONTAINMENT MODIFICATIONS

Any major modification or replacement of components of the containment performed after the initial pre-operational leakage rate test shall be followed by either an integrated leakage rate test or a local leak detection test and shall meet the appropriate acceptance criteria of Specifications 4.4.A.2, 4.4.B.2, or 4.4.D.2. Modifications or replacements performed directly prior to the conduct of an integrated leakage rate test shall not require a separate test.

F. REPORT OF TEST RESULTS

A post-outage report shall be prepared presenting results of the previous cycle's Type B and Type C tests, and Type A, Type B, and Type C tests, if performed during that outage. The technical contents of the report are generally described in ANSI/ANS 56.8-1994, and will be available on-site for NRC review. The report shall also show that the applicable performance criteria are met and serves as a record that continuing performance is acceptable.

G. VISUAL INSPECTION

A detailed visual examination of the accessible interior and exterior surfaces of the containment structure and its components shall be performed at each Refueling Interval (#) and prior to any integrated leak test to uncover any evidence of deterioration which may affect either the containment structural integrity or leak-tightness. The discovery of any significant deterioration shall be accompanied by corrective actions in accordance with acceptable procedures, non-destructive tests and inspections, and local testing where practical, prior to the conduct of any integrated leak test. Such repairs shall be

reported as part of test results.

H. RESIDUAL HEAT REMOVAL SYSTEM

1. Test

- a. (1) The portion of the Residual Heat Removal System that is outside the containment shall be tested either by use in normal operation or hydrostatically tested at 350 psig at the interval specified below.
- (2) The piping between the residual heat removal pumps suction and the containment isolation valves in the residual heat removal pump suction line from the containment sump shall be hydrostatically tested at no less than 100 psig at the interval specified below.
- b. Visual inspection shall be made for excessive leakage during these tests from components of the system. Any significant leakage shall be measured by collection and weighing or by another equivalent method.

2. Acceptance Criterion

The maximum allowable leakage from the Residual Heat Removal System components located outside of the containment shall not exceed two gallons per hour.

3. Corrective Action

Repairs or isolation shall be made as required to maintain leakage within the acceptance criterion.

4. Test Frequency

Tests of the Residual Heat Removal System shall be conducted at least once every Refueling Interval#.

Basis

The containment is designed for a calculated peak accident pressure of 47 psig⁽¹⁾. While the

reactor is operating, the internal environment of the containment will be air at essentially atmospheric pressure and an average maximum temperature of approximately 130°F. With these initial conditions, the peak accident pressure and temperature of the steam-air mixture will not exceed the containment design pressure and temperature of 47 psig and 271°F.

Prior to initial operation, the containment was strength-tested at 54 psig and was leak-tested. The acceptance criterion for this preoperational leakage rate test was established as 0.10 weight percent (L_a) per 24 hours at 47 psig and 271°F, which are the peak accident pressure and temperature conditions. This leakage rate is consistent with the construction of the containment⁽²⁾, which is equipped with a Weld Channel and Penetration Pressurization System for continuously pressurizing both the penetrations and the channels over all containment liner welds. These channels were independently leak-tested during construction.

The safety analysis has been performed on the basis of a leakage rate of 0.10 weight percent per day for 24 hours. With this leakage rate and with minimum containment engineered safeguards operating, the public exposure would be well below 10 CFR 100 values in the event of the design basis accident⁽³⁾.

The performance of a periodic integrated leakage rate test during plant life provides a current assessment of potential leakage from the containment. In order to provide a realistic appraisal of the integrity of the containment under accident conditions, the containment isolation valves are to be closed in the normal manner and without preliminary exercising or adjustments.

The frequency of the periodic integrated leakage rate test is in accordance with 10 CFR 50 Appendix J, Option B as modified by approved exemptions and in accordance with guidelines contained in Regulatory Guide 1.163, dated September 1995. The ability to use Option B is based on the following major considerations.

The first consideration is the low probability of leaks in the liner because of:

- (a) the tests of the leak-tight integrity of the welds during erection,
- (b) conformance of the complete containment to a low leakage rate limit at 47 psig or higher during pre-operational testing, and
- (c) absence of any significant stresses in the liner during reactor operation.

Secondly, the Weld Channel and Penetration Pressurization System is in service continuously to monitor leakage from potential leak paths such as the containment personnel lock seals and weld channels, containment penetrations, containment liner weld channels, double-gasketed

seals and spaces between containment isolation valves and personnel door locks. A leak would be expected to build up slowly and would, therefore, be noted before design limits are exceeded. Remedial action can be taken before the limit is reached.

During normal plant operation, containment personnel lock door seals are continuously pressurized after each closure by the Weld Channel and Penetration Pressurization System. Whenever containment integrity is required, verification is made that seals repressurize properly upon closure of an air lock door.

A full pressure test of the air lock will be periodically performed to detect any unanticipated leakage.

The containment isolation valve leakage and sensitive leakage rate measurements obtained periodically, periodic inspection of accessible portions of the containment wall to detect possible damage to the liner plates, combined with the leakage monitoring afforded by the Weld Channel and Penetration Pressurization System⁽⁴⁾ and IVSWS⁽⁵⁾, provide assurance that the containment leakage is within design limits.

The testing of containment isolation valves in Table 4.4-1, either individually or in groups, utilizes the WC & PPS⁽⁴⁾ or IVSWS⁽⁵⁾ where appropriate and is in accordance with the requirements of Type C tests in 10 CFR 50 Appendix J, Option B, as modified by approved exemptions and in accordance with guidelines contained in Regulatory Guide 1.163 dated September 1995. The specified test pressures are \geq the peak calculated accident pressure. Sufficient water is available in the Isolation Valve Seal Water System, Primary Water System, Service Water System, Residual Heat Removal System, and the City Water System to assure a sealing function for at least 30 days. The leakage limit for the Isolation Valve Seal Water System is consistent with the design capacity of the Isolation Valve Seal Water supply tank.

The acceptance criterion of $0.6 L_a$ for the combined leakage of isolation valves subject to gas or nitrogen pressurization, the air lock, containment penetrations and double-gasketed seals is consistent with 10 CFR 50 Appendix J, Option B, as modified by approved exemptions and in accordance with guidelines contained in Regulatory Guide 1.163, dated September 1995.

The 350 psig test pressure, achieved either by normal Residual Heat Removal System operation or hydrostatic testing, gives an adequate margin over the highest pressure within the system after a design basis accident. Similarly, the hydrostatic test pressure for the containment sump return line of 100 psig gives an adequate margin over the highest pressure within the line after a design basis accident. A recirculation system leakage of 2 gal./hr. will limit offsite exposures due to leakage to insignificant levels relative to those calculated for leakage directly from the containment in the design basis accident.

These specifications have been developed using Appendix J, Option B of 10 CFR 50, Regulatory Guide 1.163, "Performance -Based Containment Leak-Test Program," dated September 1995 and NEI 94-01, Rev. 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J."

The maximum permissible inleakage rate from the containment isolation valves sealed with service water for the full 12-month period of post-accident recirculation without flooding the internal recirculation pumps is 0.36 gpm per fan-cooler.

References

- (1) UFSAR - Section 5
- (2) UFSAR - Section 5.1.6
- (3) UFSAR - Section 14.3.6
- (4) UFSAR - Section 6.6
- (5) UFSAR - Section 6.5