D. Containment Integrity*

Containment integrity is defined to exist when:

1) Penetrations required to be isolated during accident conditions are either:

   a. Capable of being closed by an operable automatic containment isolation valve,

      OR

   b. Closed by an operable containment isolation valve,

      OR

   c. Closed in accordance with Specifications 15.3.6.A.1.b and 15.3.6.A.1.c.

2) The equipment hatch is properly closed.

3) At least one door in each personnel air lock is properly closed.

4) The overall uncontrolled containment leakage is less than La.**

E. Protective Instrumentation Logic

1) Analog Channel

   An analog channel is an arrangement of components and modules as required to generate a single protective action signal when required by a plant condition. An analog channel loses its identity where single action signals are combined.

---

*Containment isolation valves are discussed in FSAR Section 5.2.

**Prior to the first startup ~~following testing required by TS 15.4.4, the as-left containment leakage rates shall satisfy the acceptance criteria in TS 15.4.4.~~ after performing a required Containment Leakage Rate Testing Program leakage test, the applicable leakage limits specified in TS 15.6.12.D.2 must be met.

c. Containment Purge Supply and Exhaust Valves

The containment purge supply and exhaust valves shall be locked closed and may not be opened unless the reactor is in the cold shutdown or refueling shutdown condition.

(1) One of the redundant valves in the purge supply and exhaust lines may be opened to perform the repairs required to conform with ~~TS 15.4.4.II.B.~~ the Containment Leakage Rate Testing Program.

(2) If containment purge supply and exhaust penetration leakage results in exceeding the overall containment leakage rate acceptance criteria (L_a), enter 15.3.6.A.1.a.

E. CONTAINMENT STRUCTURAL INTEGRITY

The structural integrity of the reactor containment shall be maintained in accordance with the surveillance criteria specified in ~~15.4.4.V~~ the Containment Leakage Rate Testing Program and 15.4.4.~~V~~II.

1. If more than one tendon is observed with a prestressing force between the predicted lower limit (PLL) and 90% of the PLL or if one tendon is observed with prestressing force less than 90% of the PLL, the tendon(s) shall be restored to the required level of integrity within 15 days or the reactor shall be in hot standby within the next six hours and in cold shutdown within the following 30 hours. An engineering evaluation of the situation shall be conducted and a special report submitted in accordance with Specification 15.4.4.~~V~~II.D within 30 days.
2. With an abnormal degradation of the containment structural integrity in excess of that specified in 15.3.6.~~D~~E.1, and at a level below the acceptance criteria of Specification 15.4.4.~~V~~II, restore the containment structural integrity to the required level within 72 hours or be in hot shutdown within the next six hours and in cold shutdown within the following 30 hours. Perform an engineering evaluation of the containment structural integrity and provide a special report in accordance with Specification 15.4.4.~~V~~II.D within 30 days.

Basis

Specification 15.3.6.A.1

The Reactor Coolant System conditions of cold shutdown assure that no steam will be formed and hence there would be no pressure buildup in the containment if the Reactor Coolant System ruptures.

Specification 15.3.6.A.1.a.

The safety design basis for the containment is that the containment must withstand the pressures and temperatures of the ~~limiting DBA~~ design basis LOCA without exceeding the design leakage rate. The design allowable leakage rate (L_a) is 0.4% of containment air weight per day at 60 psig (P_a).[1]

Containment operability is maintained by limiting the overall containment leakage rate to within the design allowable leakage rate (L_a). Prior to the first startup ~~following testing required by TS 15.4.4, however, the as-left leakage rates must satisfy the acceptance criteria in TS 15.4.4.~~ after performing a required Containment Leakage Rate Testing Program leakage test, however, the applicable leakage limits specified in TS 15.6.12.D.2 must be met. Compliance with Specification 15.3.6.A.1.a. will ensure a containment configuration that is structurally sound and that will limit leakage to those leakage rates assumed in the safety analysis.

If penetration or air lock leakage results in exceeding L_a, Specification 15.3.6.A.1.a. shall be entered simultaneously with the LCO applicable to the penetration or air lock with the excessive leakage. Once the overall containment leakage rate is restored to less than L_a, Specification 15.3.6.A.1.a. may be exited and operation continued in accordance with the applicable LCO.

Specification 15.3.6.A.1.a.(1)

In the event the containment is inoperable, containment must be restored to operable status within one hour. The one hour completion time provides a period of time to correct the problem commensurate with the importance of maintaining containment integrity during plant operation. This time period also ensures that the probability of an accident (requiring containment integrity) occurring during periods when containment is inoperable is minimal.

15.4.4 CONTAINMENT TESTS

Applicability

Applies to containment leakage and structural integrity.

Objective

To verify that potential leakage from the containment and the pre-stressing tendon loads are maintained within acceptable values.

Specification

I. Perform required visual examinations and leakage rate testing in accordance with the Containment Leakage Rate Testing Program.

~~Type A Periodic Integrated Leakage Rate Test~~

~~A. Test~~

~~1. The Type A periodic in-service integrated leakage rate test shall be performed at intervals specified in I.C below at an initial pressure P_t at or above 30 psig (50% of design pressure (P_a)).~~

~~2. Test accuracy shall be verified by supplementary means such as measuring the quantity of air required to return to the starting pressure (P_t) or by imposing a known leak rate to demonstrate the validity of measurements.~~

~~3. Closure of the containment isolation valves for the purpose of the test shall be accomplished by the means provided for normal operation of the valves without preliminary exercises or adjustment. Repairs of maloperating or leaking valves shall~~

be made as necessary. Description of valve closure malfunction or valve leakage that requires corrective action before the test shall be included in the Test Report.

4. Leak repairs, if required during the integrated leakage test, shall be preceded and followed by local leakage rate measurements. A description of the repairs and the leakage rates measured prior to and after the repairs shall be included in the Test Report.

5. The test duration shall not be less than 24 hours unless the criteria listed in "a" below are met.

a. For the Absolute Method, Total Time technique, the test duration may be shortened to less than 24 hours provided the following Bechtel Corporation Topical Report (BN-TOP-1) acceptance criteria for short duration testing are met:

(1) For the containment atmosphere stabilization:

Once the containment is at test pressure the containment atmosphere shall be allowed to be stabilized for about four hours. The atmosphere is considered stabilized when:

i. The rate of change of average temperature is less than 1.0°F/hour/hour averaged over the last two hours

or

ii. The rate of change of temperature changes less than 0.5°F/hour/hour averaged over the last two hours.

(2) For the data recording and analysis, using the Absolute Method, Total Time technique:

i. The Trend Report based on Total Time calculations shall indicate that the magnitude of the calculated leak rate is trending to stabilize at a value less than the maximum allowable leak rate (L_a).

(Note: The magnitude of the calculated leak rate may be increasing slightly as it tends to stabilize. In this case, the average rate shall be determined from the accumulated data over the last five hours or last twenty data points, whichever provides the most points. Using this average rate, the calculated leak rate can then be linearly extrapolated to the 24th hour data point. If this extrapolated value of the calculated leak rate exceeds 75% of the maximum allowable leak rate (L_a) then the leak rate test is continued).

and

ii. 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 leak rate.

and

iii. The mean of the measured leak rates based on Total Time calculations over the last five hours of test or last twenty data points, whichever provides the most data, shall be less than the maximum allowable leak rate.

and

iv. Data shall be recorded at approximately equal intervals and in no case at intervals greater than one hour.

and

v. At least twenty data points shall be provided for proper statistical analysis.

and

vi. In no case shall the minimum test duration be less than six hours.

B. Acceptance Criteria

1. The governing criteria for acceptance of peak pressure tests is that the maximum allowable leakage (L_a) shall not exceed 0.40 weight percent per day of containment atmosphere at 60 psig (P_a) which is the design pressure.

2. The allowable in-service leakage rate (L_t) at the reduced test pressure (P_t) shall not exceed $L_a(L_{tm}/L_{am})$, except if L_{tm}/L_{am} is greater than 0.7, L_t shall be equal to $L_a(P_t/P_a)^{1/2}$. Where: L_a is the maximum allowable leakage rate at pressure P_a for the preoperational tests; the subscript "m" refers to values of the leakage measured during initial preoperational tests; and the subscripts "a" and "t" refer to tests at accident pressure and reduced test pressure, respectively.

3. The measured leakage rate (L_{tm}) for in-service tests shall not exceed 0.75 L_t, as determined under B-1 above.

4. The supplementary test described in I.A.2 is acceptable, provided the difference between the supplemental test data and the Type "A" test data is within 0.25 L_t. If results are not within 0.25 L_t, the reason shall be determined, corrective action taken, and a successful supplemental test performed.

5. If repairs are necessary to meet the acceptance criteria, the integrated leakage rate test need not be repeated provided local measured reductions in leakages achieved by repairs reduce the overall measured integrated leakage rate to a value not in excess of 0.75 L_t. Local leakage measurements taken to effect repairs to meet the acceptance criteria shall be taken at a test pressure P_a for full pressure tests and P_t for reduced pressure tests.

C. Frequency

1. Integrated leakage rate tests shall be performed as follows: After the initial preoperational leakage rate test, two integrated leakage rate tests shall be performed at approximately equal intervals between each major shutdown for inservice inspection to be performed at ten-year intervals. In addition, an integrated test shall be performed at each ten-year interval, coinciding with the in-service inspection shutdown. The test shall coincide with a shutdown for major fuel reloading.

2. If two consecutive Type "A" tests fail to meet the applicable

acceptance criteria in Section I.B above, a Type "A" test shall be performed at each plant shutdown for refueling, or approximately every 18 months, whichever occurs first. The accelerated test schedule shall continue until two consecutive Type "A" tests pass, after which time the retest schedule in I.C.1 may be resumed.

D. Report of Test Results

1. Each Type "A" leakage rate test will be the subject of a summary technical report, which will include summaries of Type "B" and "C" tests (Items II and III below) that were performed since the last Type "A" test.

II. Type "B" Tests

A Type "B" test measures leakage across individual and/or portions of pressure containing or leakage-limiting boundaries of primary reactor containment penetrations as defined in II.A.5.

A. Test

1. Type "B" tests shall be performed at intervals specified in II.C. below.

2. With the exception of the airlock door seal test, for the purposes of the 3 day test requirement, Type "B" tests shall be performed at a pressure of not less than P_a.

3. Testing of the airlock door seals, in lieu of the full pressure airlock test, may be used to fulfill the 3 day airlock testing requirement specified in II.C.1.d below. This airlock door seal test shall be performed with a pressure differential across the door seals of at least 10" of mercury. This pressure differential may be established via the use of a positive pressure or a vacuum. Airlock door seal testing shall not be substituted for the 6 month test of the entire air lock.

4. Acceptable methods of testing are halogen leak detection, pressure decay and fluid flow using air or nitrogen. Another method may be used if it can be shown to have equivalent sensitivity.

5. The local leakage shall be measured for each of the following components:

a. Containment penetrations that employ resilient seals, gaskets or sealant compounds, piping penetrations fitted with expansion bellows and electrical penetrations fitted with flexible metal seal assemblies.

b. Airlock and equipment door seals, including operating mechanism and penetrations with resilient seals which are part of the containment boundary in the airlock structure.

c. Fuel transfer tube flange seal.

d. The containment purge supply and exhaust valves.

e. Other containment components which require leak repair in order to meet the acceptance criterion for any integrated leakage rate test.

B. Acceptance Criterion

1. The total leakage from items II.A.5 and III.A.3 shall not exceed 0.6 L_a.

a. If at any time it is determined that 0.6 L_a is exceeded, enter the applicable LCO(s) of Section 15.3.6 immediately.

2. The leakage from the airlock doors seal test, resulting from the 3 day testing requirement in II.C.1.d, shall be considered acceptable if the leakage sum from the worst door in each airlock, extrapolated to P_a, and added to the total of items II.A.5 and III.A.3, is less than 0.6 L_a.

a. If the total identified in II.B.2, above, exceeds 0.6 L_a, then the airlock containing the worst door shall be full pressure tested to determine the actual leakage performance.

3. The leakage rate for the containment purge supply and exhaust valves shall be compared to the previously measured leakage rate to detect excessive valve degradation.

C. Test Frequency

1. Individual penetrations shall be tested during each shutdown for major fuel reloading except as specified in a and b below. In no case shall the interval be greater than two years.

a. The containment equipment hatch flange seals and the fuel transfer tube flange seals shall be tested at each shutdown for major fuel reloading or after each time used, if that be sooner.

b. The air locks shall be tested at 6-month intervals at test pressure not less than P_a.

c. Personnel airlocks shall be tested at a pressure of no less than P_a following periods when containment integrity is defeated through the use of the airlock.

d. Personnel airlocks opened during periods when containment integrity is established shall be tested within 3 days after being opened. Personnel airlocks opened more frequently than once every 3 days shall be tested at least once every 3 days during the period of frequent openings.

e. The containment purge supply and exhaust valves shall be tested at 6-month intervals.

III. Type "C" Tests

A Type "C" test measures the leakage across an individual valve or across a group of valves used to isolate an individual penetration through the primary reactor containment as defined in III.A.3.

A. Test

1. Type "C" tests shall be performed at intervals specified in III.D below and at a pressure of not less than P_a.

2. Acceptable methods of testing are by local pressurization and the methods described in II.A.4 above. The pressure shall be applied in the same direction as that when the valve would be required to perform its safety function, unless it can be determined that the results from the tests for a pressure applied in a different direction will provide equivalent or more conservative results. Each valve to be tested shall be closed by normal operation and without any preliminary exercising or adjustments.

3. Local leakage shall be measured for containment isolation valves that:

a. Provide a direct connection between the inside and outside atmospheres of the primary reactor containment under normal operation.

b. Are required to close automatically upon receipt of a containment isolation signal.

c. Are required to operate intermittently under post-accident conditions.

B. Acceptance Criterion

1. The total leakage from items II.A.5 and III.A.3 shall not exceed 0.6 L_a.

a. If at any time it is determined that 0.6 L_a is exceeded, enter the applicable LCO(s) of Section 15.3.6 immediately.

C. Test Frequency

1. The above tests of the isolation valves shall be conducted during each shutdown for major fuel reloading but in no case at intervals greater than two years.

IV. Residual Heat Removal System

A. Test

1. (a) The portion of the Residual Heat Removal System, except as specified in (b), that is outside the containment shall be tested either by use in normal operation or hydrostatically tested at 350 psig at the interval specified in IV.D below.

(b) Piping from the containment sump to the residual heat removal pump suction isolation valve shall be pressure tested at no less than 60 psig at the interval specified in IV.D. below.

2. Visual inspection shall be made for excessive leakage from components of the system. Any significant leakage shall be measured by collection and weighing or by another equivalent method.

B. Acceptance Criterion

The maximum allowable leakage from the Residual Heat Removal System components (which includes valve stems, flanges and pump seals) shall not exceed two gallons per hour.

C. Corrective Action

Repairs shall be made as required to maintain leakage within the acceptance criterion of IV-B.

D. Test Frequency

Tests of the Residual Heat Removal System shall be conducted at shutdown for major refueling.

V. Annual Inspection

A detailed visual examination of the accessible interior and exterior surfaces of the containment structure and its components shall be performed annually and prior to any integrated leak test, to uncover any evidence of deterioration which may affect either the containment's structural integrity or leak-tightness. The discovery of any significant deterioration shall be accompanied by corrective actions in accordance with acceptable procedures, nondestructive 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 the test results.

~~VI. Containment Modifications~~

~~Any major modification or replacement of components of the containment performed after the initial preoperational leakage rate test shall be followed by either an integrated leakage rate test or a local leak detection test and shall meet the acceptance criteria of I.B. and II.B, respectively. Modifications or replacements performed directly prior to the conduct of an integrated leakage rate test shall not require a separate test.~~

~~VII.~~ II. TENDON SURVEILLANCE

A. Object

In order to insure containment structural integrity, selected tendons shall be periodically inspected for symptoms of material deterioration or lift-off force reduction. The tendons for inspection shall be randomly but representatively selected from each group for each inspection; however, to develop a history and to correlate the observed data, one tendon from each group shall be kept unchanged after initial selection. Tendons selected for inspection will consist of five hoop tendons, three vertical tendons located approximately 120° apart, and three dome tendons, one from each of the three dome tendon groups.

B. Frequency

Tendon surveillance shall be conducted at five-year intervals in accordance with the following schedule:*

Unit	Year	Surveillance Required
1	1984	Physical
2	1984	Visual
1	1989	Visual
2	1989	Physical

C. Inspections

Tendon surveillance in accordance with 15.4.4.~~V~~II.B shall consist of either a visual or physical inspection.

(1) Visual Inspection

a. Tendon anchorage assembly hardware of the randomly selected tendons shall be visually examined to the extent practicable

* Subsequent five-year interval inspections repeat this pattern.

without dismantling load bearing components of the anchorage. The immediate concrete area shall be checked visually for indications of abnormal material behavior.

(2) Physical Inspection

a. Tendons which are physically inspected shall first be visually inspected in accordance with C.(1).

b. All tendons which are physically inspected shall be subjected to a lift-off test to monitor their prestressing force.

(i) If the prestressing force of a selected tendon in a group lies above the predicted lower limit, the tendon is considered to be acceptable.

(ii) If the prestressing force of a selected tendon lies between the predicted lower limit and 90% of the predicted lower limit, two tendons, one on each side of the test tendon, shall be checked for their prestressing forces. If the prestressing forces for these tendons are above the predicted lower limit for the tendons, all three tendons shall be restored to the required level of integrity. A single deficiency shall be considered unique and acceptable. If the prestressing force of either of the adjacent tendons falls below the predicted lower limit of the tendon, additional lift-off testing should be done if necessary, so that the cause and extent of such occurrence can be determined and the condition shall be considered an abnormal degradation of the containment structure and the provisions of Specification 15.3.6.~~D~~E are applicable.

(iii) If the prestressing force of the selected test tendon falls below 90% of the predicted lower limit, the tendon shall be completely detensioned and a determination shall be made as to the cause of the condition. Such a condition shall be considered an abnormal degradation of the containment structure and the provisions of Specification 15.3.6.~~D~~E are applicable.

(iv) If the average of all measured tendon forces for each group (corrected for average condition) is found to be less than the minimum required prestress level at Anchorage location for that group, the condition should be considered as abnormal degradation of the containment structure and the provisions of 15.3.6.~~D~~E are applicable. The average minimum design values adjusted for elastic losses are as follows:(6)

Hoop	134.5 ksi
Vertical	140.6 ksi
Dome	137.4 ksi

c. One randomly selected tendon from each group of tendons shall be subjected to complete detensioning in order to identify broken or damaged wires. During the retensioning of the detensioned tendon, simultaneous measurements of elongation and jacking force shall be made at a minimum of two levels of force between the required seating force and zero. During the detensioning and retensioning of the tendons tested, if the elongation corresponding to a specific load differs by more than 5% from that recorded during installation of the tendons, an investigation shall be made to ensure that such discrepancies are not related to wire failures or slippage of wires in anchorages.

d. A tendon wire shall be removed from the one tendon from each group which has been completely detensioned. The wire shall be inspected over its entire length to determine if evidence of corrosion or other deleterious effects are present. Tensile tests shall be made on three samples cut from each removed wire. The samples will be cut from the midsection and each end of the removed wire. Failure of the material to demonstrate the minimum required tensile strength of 240,000 psi shall be considered an abnormal condition of the containment structure and the engineering evaluation provisions of Specification 15.3.6.~~D~~E.1 are applicable. If an acceptable justification for continued operation cannot be concluded from this evaluation, then the shutdown requirements of Specification 15.3.6.~~D~~E.1 are applicable.

e. The sheathing filler grease will be sampled and inspected on each physically inspected tendon. The operability of the sheathing filler grease shall be verified by assuring:

1) There are no voids in the filler material in excess of 5% of net duct volume.
2) Complete grease coverage exists for the different parts of the Anchorage system, and
3) The chemical properties of the filler material are within the tolerance limits specified by the manufacturer.

D. Reports

A final report documenting the results of each tendon surveillance will be prepared and maintained as a permanent plant record.

Abnormal conditions observed during testing will be evaluated to determine the effect of such conditions on containment structural integrity. This evaluation should be completed within 30 days of the identification of the condition. Any condition which is determined in this evaluation to have a significant adverse effect on containment structural integrity will be considered an abnormal degradation of the containment structure.

Any abnormal degradation of the containment structure identified during the engineering evaluation of abnormal conditions shall be reported to the Nuclear Regulatory Commission pursuant to the requirements of 10 CFR 50.4 within thirty days of that determination. Other conditions that indicate possible effects on the integrity of two or more tendons shall be reportable in the same manner. Such reports shall include a description of the tendon condition, the condition of the concrete (especially at tendon anchorages), the inspection procedure and the corrective action taken.

~~VIII.~~ III. End Anchorage Concrete Surveillance

A. Specific locations for surveillance will be determined by information obtained from design calculations, as-built end anchorage concrete and prestressing records, observations of the end anchorage concrete during and after prestressing, and results of deformation measurements made during prestressing and the initial structural test.

B. The inspection intervals will be approximately one-half year and one year after the initial structural test and shall be chosen such that the inspection occurs during the warmest and coldest part of the year following the initial structural test.

~~IX.~~ IV. Liner Plate

A. The liner plate will be examined before the initial pressure test to determine the following:

(1) Locate areas which have inward deformations. The magnitude of the inward deformations will be measured and recorded. The areas will be permanently marked for future reference. The inward deformations will be measured between the angle stiffeners which are on 15-inch centers. The measurements will be accurate to ± .01 inch.

(2) Try to locate areas having strain concentrations by visual examination paying particular attention to the condition of the liner surface. Record the location of any areas having strain concentrations.

B. Shortly after the initial pressure test and at about one year after initial start-up, reexamine the areas located in section (A). Measure and record inward deformations. Record observations pertaining to strain concentrations.

C. If the difference in the measured inward deformations exceeds 0.25 inch (for a particular location) and/or changes in strain concentration exist, then an investigation will be made. The investigation will determine the cause and any necessary corrective action.

D. The surveillance program will only be continued beyond the one year after initial start-up inspection if some corrective action was needed. If required, the frequency of inspection for a continued surveillance program will be determined shortly after the "one year after initial start-up inspection".

E. In addition to the preceding requirements, temperature readings will be obtained at the locations where inward deformations were measured. Temperature measurements will also be obtained on the outside of the containment building wall.

Basis

The containment is designed for an accident pressure of 60 psig.[(1)] While the reactor is operating, the internal environment of the containment will be air at approximately atmospheric pressure and a temperature of about 105°F. With these initial conditions, the temperature of the steam-air mixture at the peak accident pressure of 60 psig is 286°F.

Prior to initial operation, the containment was strength tested at 69 psig and then leak-tested. The design objective of this preoperational leakage rate test was established as 0.4% by weight per 24 hours at 60 psig. This leakage rate is consistent with the construction of the containment,[(2)] which is equipped with independent leak-testable penetrations and contains channels over all containment liner welds, which were independently leak-tested during construction.

Safety analyses have been performed on the basis of a leakage rate of 0.40% by weight per 24 hours at 60 psig. With this leakage rate and with minimum containment engineered safety systems for iodine removal in operation, i.e. one spray pump with sodium hydroxide addition, the public exposure would be well below 10 CFR 100 values in the event of the design basis accident.[(3)]

The safety analyses indicate that the containment leakage rates could be slightly in excess of 0.75% per day before a two-hour thyroid dose of 300R could be received at the site boundary.

The performance of a periodic integrated leakage rate tests during plant life provides a current assessment of potential leakage from the containment in case of an accident that would pressurize the interior of the containment. These tests are performed in accordance with the Containment Leakage Rate Testing Program. ~~In order~~

to provide a realistic appraisal of the integrity of the containment under accident conditions, this periodic test is to be performed without preliminary leak detection surveys or leak repairs, and containment isolation valves are to be closed in the normal manner. The test pressure of 30 psig or greater for the periodic integrated leakage rate test is sufficiently high to provide an accurate measurement of the leakage rate and it duplicates the preoperational leakage rate test at 30 psig. The specification provides relationships for relating in a conservative manner, the measured leakage of air at 30 psig or greater to the potential leakage of a steam-air mixture at 60 psig and 286°F. The specification also allows for possible deterioration of the leakage rate between tests, by requiring the as measured leak rate to be less than 75% of the allowable leakage rate. The basis for these deterioration allowances are arbitrary judgments, which are believed to be conservative and which will be confirmed or denied by periodic testing. If indicated to be necessary, the deterioration allowances will be altered based on experience.

The duration of the integrated leak rate test will be 24 hours unless the reduced time duration acceptance criteria are met. In 1972, the AEC approved a Bechtel Corporation Topical Report, BN-TOP-1, entitled "Testing Criteria for Integrated Leakage Rate Testing of Primary Containment Structures for Nuclear Power." This report provides criteria for short duration testing for the Absolute Method using the Total Time technique. The Bechtel short duration testing criteria contains requirements for stabilization, leakage rate trending, confidence level, sufficient data for statistical convergence, and allowed leakage rate.

The frequency of the periodic integrated leakage rate test is keyed to the refueling schedule for the reactor and shutdown for inservice inspection because these tests can only be performed during refueling shutdowns. The initial core loading was designed for approximately 24 months of power operation, thus the first refueling occurred approximately 30 months after initial criticality. Subsequent refueling shutdowns are scheduled at approximately 12-18 month intervals.

The specified frequency of periodic integrated leakage rate tests is based on three major considerations. First is the low probability of leaks in the liner, because of (a) the use of weld channels to test the leak tightness of the welds during erection, (b) conformance of the complete containment to a low leak rate at 60 psig during preoperational testing which is consistent with 0.4% leakage at design basis accident conditions, and (c) absence of any significant stresses in the liner during reactor operation. Second is the more frequent testing, at the full accident pressure, of those portions of the containment envelope that are most likely to develop leaks during reactor operation (penetrations and isolation valves) and the low value ($0.6 L_a$) of the leakage that is specified as acceptable from penetrations and isolation valves. Third is the tendon stress surveillance program, which provides assurance that an important part of the structural integrity of the containment is maintained. A final point is that the 0.40%/day acceptance criterion for the integrated leakage test is indicated to be a factor of about 2 lower than necessary to meet 10 CFR 100 values.

The basis for specification of a leakage rate of $0.6 L_a$ from penetrations and isolation valves is that only six-tenths of the allowable integrated leakage rate should be from each of those sources, in order to provide assurance that the integrated leakage rate would remain within the specified limits during the intervals between integrated leakage rate tests. The allowable value of $0.6 L_a$ is found in 10 CFR Part 50, Appendix J.

The limiting leakage rates from the Residual Heat Removal System are judgement values based primarily on assuring that the components could operate without mechanical failure for a period on the order of 200 days after a Design Basis Accident. The test pressure (350 psig) achieved either by normal system

operation or by hydrostatically testing gives an adequate margin over the highest pressure within the system after a design basis accident. Similarly, the pressure test for the return lines from the containment to the Residual Heat Removal System (60 psig) is equivalent to the design pressure of the containment. A Residual Heat Removal System leakage of 2 gal/hr will limit off-site exposures due to leakage to insignificant levels relative to those calculated for leakage directly from the containment in the Design Basis Accident. The dose calculated as a result of this leakage is 7.7 mr for a 2 hour exposure at the site boundary.[5]

Periodic visual and physical inspection of the containment tendons is the method to be used to determine loss of load-carrying capability because of wire breakage or deterioration. The tendon surveillance program specified in 15.4.4.VII is based on the recommendation of Regulatory Guide 1.35 Rev. 3. Containment tendon structural integrity was demonstrated for both units at the end of one, three and eight years following the initial containment structural integrity test.

The pre-stress lift-off test provides a direct measure of the load-carring capability of the tendon. A deterioration of the corrosion preventive properties of the sheathing filler will be indicated by a change in the physical appearance of the filler. If the surveillance program indicates, by extensive wire breakage, tendon stress-strain relations, or other abnormal conditions, that the pre-stressing tendons are not behaving as expected, the abnormal conditions will be subjected to an engineering analysis and evaluation in accordance with Specification 15.4.4.VII.D to determine whether the condition could result in a significant adverse impact on the containment structural integrity. The specified acceptance criteria are such as to alert attention to the situation well before the tendon load-carrying capability would deteriorate to a point that failure during a design basis accident might be possible. Thus, the cause of the incipient deterioration could be evaluated and corrective action studied without need to shut down the reactor. If the engineering evaluation determines that the abnormal condition could result in a significant adverse impact on the containment structural integrity, an abnormal degradation situation will be declared and a report submitted to the NRC in accordance with the specifications.

15.6.9.2 Unique Reporting Requirements

A. Deleted ~~Integrated Leak Rate Test~~

~~Each integrated leak test shall be the subject of a summary technical report, including results of the local leak rate tests and isolation valve leak rate tests since the last report. The report shall include analysis and interpretations of the results which demonstrate compliance with specified leak rate limits.~~

B. Poison Assembly Removal From Spent Fuel Storage Racks

Plans for removal of any poison assemblies from the spent fuel storage racks shall be reported and described at least 14 days prior to the planned activity. Such report shall describe neutron attenuation testing for any replacement poison assemblies, if applicable, to confirm the presence of boron material.

C. Overpressure Mitigating System Operation

In the event the overpressure mitigating system (power operated relief valves in the low temperature overpressure protection mode) or residual heat removal system relief valves are operated to relieve a pressure transient which, by licensee's evaluation, could have resulted in an overpressurization incident had the system not been operable, a special report shall be prepared and submitted to the Commission within 30 days. The report shall describe the circumstances initiating the transient, the effect of the system on the transient and any corrective action necessary to prevent recurrence.

15.6.12 CONTAINMENT LEAKAGE RATE TESTING PROGRAM

A. A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September, 1995, as modified by the following exceptions:

   1. The interval between the 1992 Unit 2 Type A test and the next Unit 2 Type A test shall be 60 months.

B. The peak design containment internal accident pressure, P_a, is 60 psig.

C. The maximum allowable primary containment leakage rate, L_a, at P_a, shall be 0.4% of containment air weight per day.

D. Leakage rate acceptance criteria are:

   1. The containment leakage rate acceptance criterion is $\leq 1.0\ L_a$.

   2. During the first unit startup following testing in accordance with this program, the leakage rate acceptance criteria are $\leq 0.6\ L_a$ for the combined Type B and Type C tests and $\leq 0.75\ L_a$ for Type A tests.

E. The provisions of Specification 15.4.0.2 do not apply to the test frequencies specified in the Containment Leakage Rate Testing Program.

F. The provisions of Specification 15.4.0.3 are applicable to the Containment Leakage Rate Testing Program.