

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" or "b" below are met.
  - a. For the Absolute Method, Mass Point technique, the test duration may be shortened to less than 24 hours provided the following EPRI Project 1393-5 acceptance criteria for short duration testing are met:
    - 1) Use the absolute method, mass point technique.
    - 2) The containment must be adequately modeled by at least one of the following conditions:
      - i. The containment temperature must be modeled with a minimum of 18 resistance temperature detectors (RTD's).
      - ii. Accurate and validated temperature weighting factors must be utilized.
      - iii. The average temperature change must be less than 0.5°F during the duration of the ILRT.
    - 3) The 95 percent upper confidence level leakage rate must be zero or a positive value.
    - 4) The calculated LSF leakage must be less than .75 of the plant's allowable leakage rate criteria at test pressure as specified in 15.4.4.I.B.
    - 5) The calculated 95% confidence level must be less than .75 of the plant's allowable leakage rate criteria at test pressure as specified in 15.4.4.I.B.

- 6) The calculated LSF leakage rate as a function of time shall have stabilized with a negligible positive or negative slope, as demonstrated by the following:

$$\left| \frac{(L_n - L_{n-1}) \times 100}{(t_n - t_{n-1})(L_c - L_n)} \right| < 10$$

Where  $L_n$  = Final test point LSF leakage rate  
 $L_{n-1}$  = Leakage rate for data points taken within previous hour  
 $t_n$  = Time in hours of the last data point  
 $t_{n-1}$  = Time in hours for the data point used for  $L_{n-1}$   
 $L_c$  = Test leakage criteria (75% of allowable test pressure)

- 7) The calculated 95% upper confidence level leakage rate shall be converging with the LSF leakage rate, defined as follows:

Define:  $D_i = L_{95,i} - L_{LSF,i}$

Require:  $D_{i-1} \geq D_i$  for all  $i$  during the last test hour

- b. 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 stabilize for about four hours. The atmosphere is considered stabilized when:

- i. The rate of change of average temperature is less than  $1.0^{\circ}\text{F}/\text{hour}$  averaged over the last two hours.

or

- ii. The rate of change of temperature changes less than  $0.5^{\circ}\text{F}/\text{hour}/\text{hour}$  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 tending 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 test shall not exceed  $0.75 L_t$ , as determined under B-1 above.

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

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

C. Corrective Action

1. If at any time it is determined that  $0.6 L_a$  is exceeded, repairs shall be initiated immediately. After repair, a retest to confirm conformance to the acceptance criterion of III.B is required.
2. If repairs are not completed and conformance to the acceptance criterion of III.B is not demonstrated within 48 hours, the reactor shall be taken to cold shutdown conditions until repairs are effected and the local leakage meets this acceptance criterion.

D. 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.