Type B Tests. (1) Except for airlocks, Type B tests must be performed during reactor shutdown for refueling, or other convenient intervals, but in no case at intervals greater than 2 years. If opened following a Type A or B test, containment penetrations subject to Type B testing must be tested prior to returning the reactor to an operating mode requiring containment integrity. For primary reactor containment penetrations employing a continuous leakage monitoring system, Type B tests, except for tests of airlocks, may be performed every other reactor shutdown for refueling but in no case at intervals greater than 3 years.

(2) Airlocks must be tested prior to initial fuel loading and at 6-month intervals thereafter. Airlocks opened during periods when containment integrity is not required by the plant's technical specifications must be tested at the end of such periods. Airlocks opened during periods when containment integrity is required by the plant's technical specifications must be tested within 3 days after being opened. For airlock doors opened more frequently than once every 3 days, the airlock must be tested at least once every 3 days during the period of frequent openings. For airlock doors having testable seals, testing the seals fulfills the 3-day test requirement. Airlock door seal testing must not be substituted for the 6-month test of the entire airlock at not less than P_a, the calculated peak containment pressure related to the design basis accident.

Type C Tests. Type C tests must be performed during each reactor shutdown for refueling but in no case at intervals greater than 2 years.

There have been two amendments to this appendix since 1973. The first amendment published September 22, 1980 (45 FR 62789), modified the Type B penetration test requirements to conform to what had become accepted practice through the granting of exemptions. The second amendment published November 15, 1988 (53 FR 45890) incorporated the Mass Point statistical analysis technique as a permissible alternative to the Total Time and Point-to-Point techniques specified in appendix J.

European Experience

A combination of Type A tests and an on-line monitoring (OLM) capability is being actively pursued in Europe, notably in France and Belgium, and is currently being considered in Sweden. OLM is used to identify a ''normal'' containment pressurization pattern and to detect deviations from that pattern. The Belgians conduct a leak test using OLM during reactor operation after each cold shutdown longer than 15 days with the objective of detecting gross leaks. The objective of the Belgian approach to Type A testing is to reduce the frequency and duration of the tests. The Type A test is conducted at a containment pressure (P_t) not less than half of the peak pressure (0.5 P_a). It is performed once every 10 years.

In France, containment leaktightness is being continuously monitored during reactor operation in all of the French PWR plants using the SEXTEN system. It is also being evaluated by the Swedes for their PWR units. Leaks may be detected during the positive or negative pressure periods in the containment by evaluating the air mass balance in the containment. Type A tests are conducted at containment peak pressure (loss-of-coolant accident pressure) before initial plant startup, during the first refueling, and thereafter every 10 years unless a degradation in containment leak-tightness is detected. In that case, tests are conducted more frequently.

Further details of European approaches to containment testing is provided in Draft NUREG–1493.

Advance Notices for Rulemaking and Public Comments

Over time, it has become apparent that variations in plant design and operation frequently make it difficult to meet some of the requirements contained in appendix J because of its prescriptive nature. Economic and occupational exposure costs are directly related to the frequency of containment testing. Containment integrated leak rate tests (Type A) preclude any other reactor maintenance activities and thus are on the critical path for return to service from reactor outages. In addition to the costs of the tests, integrated leak tests impose the added burden of the cost of replacement power. Containment penetration leak tests (Type B and C) can be conducted during reactor shutdowns in parallel with other activities and thus tend to be less costly; however, the large number of penetrations impose a significant burden on the utilities. Additionally, risk assessments performed to date indicate that the allowable leak rate from containments can be increased, and that control of containment leakage at the current low rates is not as risk significant as previously assumed.[2] [3]

Initial NRC Proposal

In August of 1992, the Commission initiated a rulemaking to modify appendix J to make it less prescriptive and more performance-oriented. The Commission also initiated a plan to relax the allowable containment leak-rate utilized to define performance standards for containment tests. In the **Federal Register** published on January 27, 1993 (58 FR 6196), the NRC indicated the following potential modifications to appendix J of 10 CFR part 50 would be considered:

(1) Increase allowable containment leak-rates based on Safety Goals and PRA technology (i.e., define a new performance standard).

(2) Modify appendix J to be a performance-based regulation:

A Limit the revised rule to a new regulatory objective: In order to ensure the availability of the containment during postulated accidents, licensees should either:

(i) Test overall containment leakage at intervals not longer than every 10 years, and test pressure-containing or leakage-limiting boundaries and containment isolation valves on an interval based on the performance history of the equipment; or

(ii) Provide on-line (i.e., continuous) monitoring of containment isolation status.

B Remove prescriptive requirements from appendix J and preserve useful portions as guidance in a NRC regulatory guide.

C Endorse industry standards on:

(i) Guidance for calculating plant-specific allowable leak-rates based on new NRC performance standard;

(ii) Guidance on the conduct of containment tests; and

(iii) Guidance for on-line monitoring of containment isolation status.

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[2] Severe Accident Risks: An assessment for five U.S. Nuclear Power Plants, Final Summary Report.'' NUREG–1150, December 1990. Copies of NUREGs may be purchased from the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20013/7082. Copies are also available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. A copy is available for inspection and/or copying in the NRC Public Document Room, 2120 L Street, NW. (Lower Level), Washington, DC.

[3] Performance-Based Containment Leak Test Program,'' Draft NUREG–1493, January 1995. A free single copy of draft-1493 may be requested by those considering public comment by writing to the U. S. Nuclear Regulatory Commission, ATTN: Distribution Section, Room P1–37, Washington, DC 20555. A copy is also available for inspection and/or copying in the NRC Public Document Room, 2120 L Street, NW. (Lower Level), Washington, DC 20555.