

(containment, penetrations, valves) as the means to justify an increase in the testing interval for Type A, B, and C tests. The revised regulation would require tests to be conducted on an interval based on the performance of the containment structure, penetration or valves without specifying the interval in the regulation. Currently, three Type A tests are conducted in every 10 year period. Type B (except airlocks, which are tested more frequently) and C tests are conducted on a frequency not to exceed 2 years.

The NRC proposes to base the frequency of Type A tests (ILRTs) on the historical performance of the overall containment system. Specific findings documented in draft NUREG-1493 that justify the proposal include:

1. The fraction of leakages detected only by ILRTs is small, on the order of a few percent.
2. Reducing the frequency of ILRT testing from three per 10 years to one per 10 years leads to a marginal increase in risk.

3. ILRTs also test the strength of the containment structure. No alternative to ILRTs have been identified to provide assurance that the containment structure will meet allowable leakage rates during design-basis accidents.

4. At a frequency of one test per 10 years, industry-wide occupational exposure would be reduced by 0.087 person-sievert (8.7 person-rem) per year.

Based on specific, detailed analyses of data from the North Anna and Grand Gulf plants and data from twenty-two nuclear plants (see draft NUREG-1493), performance-based alternatives to current LLRT methods are feasible with marginal impact on risk. Specific findings that justify the proposal include:

1. Type B and C tests detect a very large fraction, over 97 percent of containment leakages.

2. Of the 97%, virtually all leakages are identified by LLRTs of containment isolation valves (Type C tests).

3. Based on the detailed evaluation of the experience of a single 2-unit station, no correlation of failures with type of valve or plant service could be found.

4. For the 20 years of remaining operations, changing the Type B/C test frequency alone is estimated to reduce industry-wide occupational exposure by 0.72 person-sievert (72 person-rem) per year. If 20-year license extension is assumed, the estimate is 0.75 person-sievert (75 person-rem) per year.

Reducing the frequency of ILRTs will reduce future industry testing costs by approximately \$330 to \$660 million if tests are conducted once per 10 years versus the current three per ten years.

These savings represent about 65 percent of the remaining costs of current appendix J requirements. Performance-based LLRT alternatives are estimated to reduce future industry testing costs by \$40 million to \$55 million. These savings represent about five percent of the total remaining costs of appendix J testing.

Therefore, based on the risks and costs evaluated, and other considerations discussed above, a performance-based appendix J which encompasses the following principles which differ moderately from those first described in the **Federal Register** (January 27, 1993 58 FR 6197) is proposed:

*General.* (1) Make appendix J less prescriptive and more performance-oriented; (2) Move details of appendix J tests to a regulatory guide as guidance; (3) Endorse approved industry guideline (NEI 94-01) on guidance on the conduct of containment tests in a regulatory guide. The methods for testing are contained in an industry standard (ANSI/ANS 56.8-1994) which is referenced in the NEI guideline; (4) Allow voluntary adoption of the new regulation, i.e., current detailed requirements in appendix J will continue to be acceptable for compliance with the modified rule.

*Leakage Limits.* Acknowledge the less risk-significant nature of allowable containment leakage ( $L_a$ ) but pursue its modification as a separate action.

*Type A Test Interval.* (1) Based on the limited value of integrated leak-rate tests (ILRTs) in detecting significant leakages from penetrations and isolation valves, establish the test interval based on the performance of the containment system structure; (2) The performance criterion of the test will continue to be the allowable leakage rate ( $L_a$ ); (3) The industry guideline allows extension of the Type A test interval to once every 10 years based on satisfactory performance of two previous tests; (4) In the regulatory guide, the NRC has included an exception for the extension of the interval of the general visual inspection of the containment system, and limited the interval to three times every 10 years as is current practice.

*Type B & C Test Interval.* (1) Allow local leak-rate test (LLRTs) intervals to be established based on the experience history of each component; (2) The performance criterion for the tests will continue to be the allowable leakage rate ( $L_a$ ); (3) Specific performance criteria and factors for establishing extended test intervals (up to 10 years for Type B components, and 5 years for Type C components) are contained in the regulatory guide and industry guideline.

In the regulatory guide, the NRC has included an exception to the extension of Type C test intervals up to 10 years that is proposed in the NEI industry guideline, and limited such extensions to 5-years.

### Specific Areas for Public Comment

In its preliminary criteria for developing performance-based regulations, the NRC identified three issues to be addressed by the rulemaking process as a measure of the viability of the revised rule. These issues have been addressed in the rulemaking package and the NRC is seeking further public input on them.

1. Can the new rule and its implementation yield an equivalent level of, or would it only have a marginal impact on, safety?

The present study analyzed risks to the population and to workers from changes in appendix J requirements. The results of the present analysis confirm that population risks from severe reactor accidents are not sensitive to containment leak-rates. The calculated risks are well below the Safety Goals for all of the reactors considered even at assumed containment leak-rates 100-fold above current requirements. A change in the allowable leak-rate is estimated to have a negligible impact on occupational exposure. Results also show that relaxing the frequency of Type A, B, and C tests leads to an increase in overall reactor risk of approximately two percent. This increase is considered to be marginal to safety. Due to limitations of available plant data, the uncertainties of the risk impact of extending Type C test intervals beyond sixty months needs to be addressed.

Costs associated with complying with current appendix J requirements are estimated to be \$165,000 for a complete battery of Type B/C tests, and \$1,890,000 for Type A tests. Over the average remaining lifetime of 20 years, the present value of all remaining leak testing is about \$7 million per reactor at a five percent discount rate. The estimates of remaining industry-wide costs to comply with the requirements of the current appendix J are approximately \$720 to \$1,080 million at a five percent discount rate, over 75 percent of which could be averted with a risk-based rule.

Based on the results of the present study, the NRC concludes that its safety objective for containment integrity can be maintained while at the same time reducing the burden on licensees. Thus, the new rule and its implementation can yield an equivalent level of, or only have a marginal impact on, safety.