

Containment Integrated Leak Rate Test Extension

Background

In 1995, the U.S. Nuclear Regulatory Commission (NRC) provided an Option B to Title 10 Code of Federal Regulations (CFR) Part 50, Appendix J, which is a performance-based approach to leakage testing requirements that allows licensees with acceptable test performance history to change surveillance frequencies. Addressed with the performance-based approach are the surveillance frequencies for Type A, B and C tests. The Type A test assesses the overall leakage of containment. The Type B test assesses leakage for containment penetrations. The Type C test assesses leakage for containment isolation valves. At that time, provisions were made for extending the Type A test (integrated leak rate test [ILRT]) frequency from 3-in-10 years to 1-in-10 years.

In the early 2000s, a number of licensees began to submit requests for a one-time ILRT interval extension to 15 years. Recently a method was developed to change the surveillance interval to 15 years on a permanent basis.

In June 2012, the NRC endorsed the guidance of the Nuclear Energy Institute (NEI) on this extension (NEI 94-01, Revision 3, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J"). This approach is consistent with Electric Power Research Institute analyses on the subject. The justification for extending test intervals is based on an acceptable performance history and risk insights.

Description

The ILRT extension assessment offered by Westinghouse is developed consistent with the guidance in NEI 94-01, Rev. 3, and assesses the risk impact of extending a plant's current ILRT surveillance testing frequency to once per every 15 years on a permanent basis, and reviews the surveillance performance history. There are several general steps for the risk assessment. These consider eight containment release scenarios and the person-rem exposure for these eight scenarios, and evaluate the risk impact of changing the test interval to 15 years. The impact on risk is addressed in terms of large early release frequency, and the impact of the change on the conditional containment failure probability and population dose.

Evaluations are completed to assess the sensitivity of the results to assumptions in the liner corrosion analysis, external events, and to the fractional contribution of increased large isolation failures (due to liner breach). Performance history for the test is reviewed so that it is acceptable. Acceptable performance history is defined as at least two successful consecutive tests. In addition, it will be confirmed that there were no events that contributed to significant liner degradation.

In addition to completing and documenting the risk assessment and performance history acceptability, Westinghouse can develop the License Amendment Request.

Benefits

The risk assessment demonstrates that there is very little risk associated with the extension of ILRT intervals to a permanent 15 years. There is a large cost benefit in reducing containment leakage test intervals since the tests are expensive and on the outage critical path, and only provide a very limited benefit from a risk perspective.

Experience

Westinghouse has recently completed an ILRT extension risk assessment for a Westinghouse Nuclear Steam Supply System plant. Westinghouse has also supported eight plants with previous analyses to justify one-time changes to 15 years.