NUCLEAR ENERGY INSTITUTE

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September 2, 2009

Ms. Tanya Mensah
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: NEI Technical Report 94-01, Revision 2-A Supplement 1

Project Number: 689

Dear Ms. Mensah:

NEI Technical Report 94-01, Revision 2-A, "Industry Guideline for Implementing the Performance-Based Option of 10 CFR Part 50, Appendix J" includes provisions for extending the performance-based Type A test interval to 15 years using a risk-informed regulatory approach. NRC issued the Safety Evaluation Report approving Revision 2-A on June 25, 2008 and intends to endorse it in Draft Regulatory Guide-1220, "Performance Based Containment Leak Test Program."

Subsequent to issuance of the NRC Safety Evaluation for NEI Technical Report 94-01, NEI identified a concern with the grace period for testing Type C components. The wording in the NEI Technical Report would cause an undue burden for those plants on a 24-month fuel cycle. As a result, we propose to change NEI 94-01 to alleviate this concern. The comment and rational for the change to NEI 94-01, Revision 2-A is described below:

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Section 10.1, last paragraph:
(The text quoted below comes from NEI 94-01, Revision 2-A. Deletions of the current revision are in strikethrough and insertions are underlined).

> For Type B test intervals of up to 120 months, the recommended surveillance interval may be extended for up to 25 percent, not to exceed nine months ~~C~~consistent with standard Technical Specifications Required Surveillances scheduling practices. ~~of up to 60~~ 120 ~~months for the recommended surveillance frequency for Type B and Type C testing given in this section may be extended by up to 25 percent of the test interval, not to exceed nine months.~~
>
> For Type C test intervals of up to 60 months, the recommended surveillance interval may be extended for up to 25 percent, not to exceed fifteen months consistent with standard Technical Specifications Required Surveillances scheduling practices. This extension may only be applied provided the extended interval Type C tests are performed on a staggered test basis (as defined in Technical Specifications).

Removing "Type C" from the first paragraph corrects a change incorporated in the last revision to NEI 94-01. Restricting extensions to Type C testing from 15 months to less than 9 months would result in plants with 24 month fuel cycles having to complete the tests every two cycles instead of every three cycles. The change to a 9 month extension limit would result in an overly restrictive requirement and may preclude 24 month fuel cycle plants from utilizing NEI 94-01.

The addition of the last sentence in the second paragraph precludes performing all the tests during a single outage. A staggered test basis, as defined by standard Technical Specifications, requires performance of approximately equal numbers of the test population during each outage.

NEI requests that NRC review and approve the above mentioned changes to NEI Technical Report 94-01. If the changes are approved,

- NEI intends to include the new text and the associated NRC Safety Evaluation Report within the published version of NEI 94-01 and reissue it as Revision 3-A. Revision 3-A will not include any other changes.
- DG-1220 will need to be revised to indicate the newly endorsed version of the NEI report.

Because the change is not extensive and has already been discussed with your staff, we understand that the NRC may be able to issue a revised Safety Evaluation for the Technical Report Supplement within 60-days. A rapid completion of your review would ensure that the necessary changes could be incorporated into DG-1220 during its current comment period. The affected page of NEI 94-01 has been marked-up and is enclosed along with the final version of the page for your review.

An NRC letter (J. E. Dyer) to NEI (James H. Riley) dated August 6, 2009 concluded that NRC staff review of NEI 94-01 is exempt from the fee recovery provision contained in 10 CFR Part 170.

If you have any questions, please feel free to contact me at (202) 739-8137; jhr@nei.org or Julie Keys at (202) 739-8128; jyk@nei.org.

Sincerely,

James H. Riley

Enclosure

c: Ms. Stacey L. Rosenberg, NRR/ADRO/DPR/PSP, NRC
NRC Document Control Desk

This section discusses the method to determine extended test intervals for Type B and Type C tests based on performance. It presents a range of acceptable intervals based upon industry data that have been analyzed through a process similar to that used by NRC in NUREG–1493, and have been reviewed for safety significance. Individual licensees may adopt a testing interval and approach as discussed in this guideline provided that certain performance factors and programmatic controls are reviewed and applied as appropriate. Programmatic controls may be necessary to ensure that assumptions utilized in analysis of the industry data are reasonably preserved at individual facilities.

The range of recommended frequencies for Type B and Type C tests are discussed in Section 11.0. The proposed frequencies are in part based upon industry performance data that was compiled to support the development of Option B to Appendix J, and a review of their safety significance. A licensee should develop bases for new frequencies based upon satisfactory performance of leakage tests that meet the requirements of Appendix J. Additional considerations used to determine appropriate frequencies may include service life, environment, past performance, design, and safety impact. Additional technical information concerning the data may be found in NUREG–1493.

~~Consistent with standard scheduling practices for Technical Specifications Required Surveillances, intervals for the recommended surveillance frequency for Type B and Type C testing given in this section may be extended by up to 25 percent of the test interval, not to exceed 15 months.~~ INSERT "A"

10.2 Type B and Type C Testing Frequencies

The testing interval for each component begins after its Type B or Type C test is completed and ends at the beginning of the next test. If the testing interval ends while primary containment integrity is not required or is required solely for cold shutdown or refueling activities, testing may be deferred; however, the test must be completed prior to the plant entering a mode requiring primary containment integrity.

Leakage rates less than the administrative leakage rate limits are considered acceptable. Administrative limits for leakage rates shall be established, documented and maintained for each Type B and Type C component prior to the performance of local leakage rate testing in accordance with the guidance provided in ANSI/ANS-56.8-2002, Sections 6.5 and 6.5.1. The administrative limits assigned to each component should be specified such that they are an indicator of potential valve or penetration degradation. Administrative limits for airlocks may be equivalent to the surveillance acceptance criteria given for airlocks in Technical Specifications.

This section discusses the method to determine extended test intervals for Type B and Type C tests based on performance. It presents a range of acceptable intervals based upon industry data that have been analyzed through a process similar to that used by NRC in NUREG–1493, and have been reviewed for safety significance. Individual licensees may adopt a testing interval and approach as discussed in this guideline provided that certain performance factors and programmatic controls are reviewed and applied as appropriate. Programmatic controls may be necessary to ensure that assumptions utilized in analysis of the industry data are reasonably preserved at individual facilities.

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For Type B test intervals of up to 120 months, the recommended surveillance interval may be extended for up to 25 percent, not to exceed nine months consistent with standard Technical Specifications Required Surveillances scheduling practices.

For Type C test intervals of up to 60 months, the recommended surveillance interval may be extended for up to 25 percent, not to exceed fifteen months consistent with standard Technical Specifications Required Surveillances scheduling practices. This extension may only be applied provided the extended interval Type C tests are performed on a staggered test basis (as defined in Technical Specifications).

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Basis for 15-month "grace" interval extension for Type C containment isolation valve local leak rate tests

Background

An editorial mistake was made to the last paragraph of Section 10.1 in Revision 2A of NEI 94-01 restricting the permissible "grace period" extension of Type C local leak rate tests from the original 15 months to 9 months:

> *"Consistent with standard scheduling practices for Technical Specifications required surveillances, intervals of up to 60 months for the recommended surveillance frequency for Type B and Type C testing given in the section may be extended by up to 25 percent of the test interval, not to exceed **nine** months."*

As this change presents a hardship for units on 24-month fuel cycles, it is highly desirable to reinstate the original 15-month extension.

It should be noted that NEI 94-01 provides both risk and performance-based guidance. Regarding Type C tests, the intervals may be increased based on completion of two consecutive periodic as-found Type C tests where the result of each test is within a licensee's allowable administrative limits. If there is a decline in performance, this guidance requires the test interval to be reduced to the base interval of 30 months. The maximum interval specified in NEI 94-01, Rev. 0 is 120 months; however, Regulatory Guide 1.163 restricted the interval to 60 months for several reasons including uncertainties in historical Type C component performance data.

In the Final Rule for 10 CFR Part 50 Appendix J, Option B published in the Federal Register on September 26, 1995, Volume 60, No. 186, Page 49502, the NRC stated "The extension of LLRT test intervals to 5 years is a prudent first step. By allowing 25 percent margin in testing frequency requirements, the NRC has provided the flexibility to accommodate longer fuel cycles." A 25 percent margin on a test interval of 5 years (60 months) would be 15 months. It would seem that the NRC specifically provided the 15 month grace period to accommodate plants on a 24-month fuel cycle.

Performance Data

An industry survey was conducted in about 2001 primarily to collect leakage rate testing information and data necessary to support extension of Type A test intervals. Information on local leak rate testing (LLRT) was obtained at the time to validate and demonstrate that excessive penetration leakage paths were identified by LLRTs vs. ILRTs. A survey question also requested information regarding any Type C failures contributing to exceeding the LLRT aggregate limit of 0.6La. Of the organizations that responded to this request covering the time period between 1995 and 2001, there were several replies indicating excessive leakage. For the most part, these leakages were associated with containment ventilation isolation valves (purge valves) and BWR main steam, and feedwater isolation valves. The frequency for testing purge, BWR main steam and feedwater isolation valves are specifically limited in NEI 94-01R2A and in Regulatory Guide 1.163. Other valve frequencies are limited by the performance criteria

in NEI-94-01. In addition, the maintenance rule essentially requires increased attention for valves that exhibit repetitive failures.

A conclusion documented in NUREG-1777 (2003) states:

> "Trending of valve failures reported in Nuclear Plant Reliability Data System, Equipment Performance and Information Exchange, and licensee event reports showed generally improving performance (fewer failures per year). The limited data available since the adoption of the revised Appendix J, when taken in conjunction with the larger database considered as part of the revision to Appendix J, does not show a statistically significant change in the trend of the number of failures per year. Since the performance of valves has not significantly changed, the failure rates assumed in support of the revision to Appendix J were appropriate, and may be conservative."

The Appendix J Owners Group (APOG) recently surveyed the industry to ask "What percentage of your extended interval valves exhibit a significant increase in leakage over this period?" The result of this survey showed that less than 1.5% of these valves were found to have significant increases in leakage when tested at the end of the extended interval. In addition, these leakages did not result in violation of the combined penetration leakage limit of 0.6La.

Plants on 24-month cycles

A plant on 24-month fuel cycles has refueling outages that can occur at 24, 48, and 72 months beyond an initial point. In the past, such plants were able to apply the 15 month grace period for Type C tests extending the interval to ≤75 (60+15) months where appropriate. It is simply not economically feasible to truncate a fuel cycle to accommodate LLRT, so if a plant wishes to employ NEI 94-01R2A in its present form, Type C tests of well-performing valves would be required at more frequent (48 month) intervals. In addition to requiring more resources, this more frequent testing would also result in increased radiation exposure, and a slight increase in shutdown risk (See EPRI TR-105189, "Shutdown Risk Impact Assessment for Extended Containment Testing Intervals Utilizing ORAM™").

APOG estimates that about one-third of the US plants are now on 24-month fuel cycles, and as described, would be adversely impacted by a reduction in the extended test interval grace period.

Risk of Grace Period Extension

As referred to in NEI 94-01, EPRI TR-104285 provided a risk impact assessment of alternative testing intervals for both ILRT and LLRT. The Type C risk (using population dose as the metric) was determined using valve performance data obtained from industry by the Nuclear Energy Institute (NEI). This data was very conservatively applied to the risk determination by assuming that the leakage magnitude for a penetration would be that by which one of the valves in the penetration fails its administrative limit. Following is a tabulation of risk impact due to Type C testing for various extended Type C testing intervals:

Interval >	24 months	48 months	60 months	72 months	120 months
PWR Type C dose (1)	4.9E-3	8.8E-3	1.0E-2	1.2E-2	1.6E-2
PWR Type C dose, % of Total (2)	0.022%	0.04%	0.045%	0.054%	0.073%
BWR Type C dose (1)	4.5E-5	1.1E-4	1.8E-4	2.3E-4	5.0E-4
BWR Type C dose, % of Total (2)	0.0023%	0.0056%	0.0092%	0.012%	0.026%

(1) Dose is quantified in units of person-rem/yr

(2) Total dose represents total integrated risk from all accidents, testing, etc. and is dominated by severe accident phenomena. Risk impact of testing is a small fraction of this. The total dose for representative plants was determined to be about 22 person-rem/year for PWRs and about 1.95 person-rem/year for BWRs.

Inspection and interpolating the results in the table indicates that the risk impact associated with increasing the Type C grace period from 9 months to 15 months (effective test intervals of 69 and 75 months, respectively for a nominal 60-month interval) is extremely small. In fact, the analysis supports performing this type of testing at intervals of ≤120 months. The nominal Type C extended testing interval could well be set at 72 months, which would provide guidance for plants that would not routinely employ utilization of grace periods.

Conclusions

About one-third of plants now utilize 24-month fuel cycles, and are therefore burdened by the grace period reduction and these plants will likely not take advantage of the ILRT Type A testing extension.

In summary, the risk impact of utilizing a grace period of 15 vs. 9 months is extremely small. Reducing the grace period to nine months results in more frequent performance of Type C tests for well-performing valves with attendant increases in shutdown risk, radiation exposure and resource utilization (cost). Leak-tight performance of valves subject to Type C testing has not degraded in since 1995 and in many cases has improved due to application of maintenance rule guidance for dealing with specific valves that exhibit poor performance as well as compliance with the guidance in NEI 94-01 which does not permit test interval extension beyond the base 30 months for valves whose performance is poor. Because of the performance-based (and self-policing) nature of 10 CFR 50, Appendix J, Option B and NEI 94-01, excessive leakages for valves on extended intervals will result in reducing the interval to the basic interval until and when satisfactory performance is demonstrated.