July 7, 2005

Mr. Alex Marion
Senior Director, Engineering
Nuclear Operations Division
Nuclear Energy Institute
1776 I Street, NW , Suite 400
Washington DC, 20006-3708

SUBJECT: ACTIONS TAKEN IN RESPONSE TO REACTOR COOLANT SYSTEM LEAKAGE

Dear Mr. Marion:

As you are aware, the Davis-Besse Lessons Learned Task Force (DBLLTF) made several recommendations pertaining to reactor coolant system (RCS) leakage monitoring. As a result of these recommendations, the Nuclear Regulatory Commission (NRC) changed, and is continuing to change, its oversight of this area. For example, the NRC recently revised Appendix D to Inspection Manual Chapter (IMC) 2515 (ML050410038) on the actions the resident inspectors should take in response to unidentified leakage.

In addition to the changes in the oversight program, the NRC staff has identified a number of technical issues related to leakage monitoring. As discussed further below, developing standard industry guidance on the actions licensees should take in response to unidentified leakage would be useful. We believe the development of such guidance would optimize NRC and industry resources similar to what has been achieved through the use of the Electric Power Research Institute (EPRI) steam generator primary-to-secondary leakage guidelines. To this end, we request a meeting to facilitate NRC and industry interactions on this topic.

The technical specifications (TSs) at most plants indicate that plants can operate with some level of unidentified leakage. Unidentified leakage limits are typically 1 gallon per minute (gpm) for pressurized water reactors and 5 gpm for boiling water reactors. Possible sources of unidentified leakage include the reactor coolant pressure boundary (RCPB), the non-RCPB portion of the RCS, and other sources. If the source of unidentified leakage is determined to be a through wall flaw in the RCPB, the plant must be shut down.

Under certain circumstances, low levels of unidentified leakage can pose a safety concern because (1) it could imply that a component no longer has adequate structural integrity even when the amount of leakage is less than the TS limits and (2) the leakage may affect the integrity of the leaking or other component (e.g., through boric acid corrosion). A component without adequate structural integrity will no longer be able to perform its intended safety function under normal operation or postulated accident conditions (with the factors of safety, or regulatory margin, inherent in the original design). NUREG/CR-6861, “Barrier Integrity Research Program: Final Report,” (ML043580207) provides additional details regarding the implications of leakage and the capabilities of leakage detection methods.

In addition, the accumulation of boric acid in containment can challenge the ability to maintain the pH of the emergency core cooling sump following a loss of coolant accident (refer to NRC Information Notice 2004-21, "Additional Adverse Effect of Boric Acid Leakage: Potential Impact on Post-Accident Coolant pH").

Given the safety implications and consequences of leakage, the industry typically begins investigating the source of unidentified leakage at levels less than their TS limits. The actions taken upon detection of unidentified leakage and the time frame for accomplishing these actions, however, are not specified in the TSs provided the unidentified leak rate is less than the TS limit. As a result, licensee actions in response to detecting unidentified leakage tend to be ad-hoc and vary depending on the magnitude of the leakage, the rate of increase in the leakage rate, and other factors (past inspections, need for other maintenance, etc.).

The NRC Inspection Procedure, Appendix D to IMC 2515, specifies action levels that trigger increased levels of NRC interaction with licensees in response to unidentified leakage. The focus of these interactions is on the determination of the source of the leakage, adverse trends in the leakage rate, the potential implications of the leakage to the structural integrity of the leaking component, and the consequential affects associated with the leakage (e.g., boric acid corrosion).

Given the potential safety issues discussed above and NRC staff interactions with licensees on their response to unidentified leakage, the NRC staff believes there are advantages if the industry standardizes its response to unidentified leakage. A standardized approach currently exists for addressing primary-to-secondary leakage in steam generators, and this approach has been effective across the industry, resulting in a reduced level of NRC oversight in this area. This topic was briefly mentioned during a February 16, 2005, meeting with representatives of the Westinghouse Owners Group (ML050680330) in which an effort to standardize the methodology for calculating the leak rate was discussed. Interactions with the industry on this issue may also lead to improved NRC procedures (e.g., IMC 2515), guidance (e.g., Regulatory Guide 1.45), and requirements. These changes may lead to more appropriate requirements to enhance safety and effectiveness in this area.

Given the potential safety issues discussed above, the staff requests a meeting to facilitate discussions between the NRC staff and the appropriate industry representatives to (1) discuss typical plant actions taken in response to unidentified leakage (e.g., action levels and response), (2) discuss actions the industry is currently taking, or is planning to take, to standardize and improve plant-specific leakage monitoring programs in light of the safety issues discussed above, and (3) to discuss the schedule for these activities. We would like to have this meeting within the next several months.

If you would like to discuss this request further, please contact me at (301) 415-3298.

Sincerely,

/RA/

Michael E. Mayfield, Director ***/RA/***
Division of Engineering
Office of Nuclear Reactor Regulation

cc: J. Riley, NEI

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