November 26, 2008

Dr. William J. Shack, Chairman
Advisory Committee on Reactor Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: STATUS OF RESOLUTION OF GENERIC SAFETY ISSUE 191, "ASSESSMENT OF DEBRIS ACCUMULATION ON PWR SUMP PERFORMANCE"

Dear Dr. Shack:

Thank you for the October 22, 2008, letter to Chairman Klein regarding the Advisory Committee on Reactor Safeguards' (Committee) views on the staff's progress and approach to resolving generic safety issue (GSI) 191, "Assessment of Debris Accumulation on PWR [Pressurized Water Reactor] Sump Performance." The October 22, 2008, letter was in response to discussions with the staff during the 556th meeting of the ACRS, October 2, 2008.

The ACRS letter includes the following conclusions:

- Significant progress has been made towards resolving GSI-191.
- All licensees have installed significantly larger sump screens and some have undertaken further actions, such as changing fibrous insulation and chemical buffer.
- Nearly all licensees have conducted head loss testing for their new screen systems and the staff has developed adequate guidance to support its review of tests that are conducted using procedures which ensure that substantially all the fine scale debris is transported to the screens.
- Adequate guidance has been developed to support review of the testing of the effects of chemical reaction products on screen head loss.
- Programs are being put in place to determine the amount of debris and chemical products that passes through sump screens, as well as their effects on core cooling.
- The staff has proposed a systematic process that, with the development of the guidance recommended by the ACRS (as discussed below), will provide an acceptable framework for closure of GSI-191.

The letter also includes the following two recommendations:

- To ensure the prototypicality of tests for extrapolation to plant conditions, further guidance should be developed for the test cases in which a significant portion of the debris is allowed to settle out upstream of the screens.

- Guidance should be developed to ensure that in-vessel downstream effects testing covers a wide enough range of conditions to support the staff's review of in-vessel downstream effects.

With regard to the first recommendation, the U.S. Nuclear Regulatory Commission (NRC) staff has developed high-level guidance regarding testing that allows debris settling in "NRC Staff Review Guidance Regarding Generic Letter 2004-02 Closure in the Area of Strainer Head Loss and Vortexing," dated March 2008 (Agencywide Document Access and Management System (ADAMS) Accession Number ML080230038). This guidance recognizes that if debris settlement is credited, it is important for the turbulence-induced suspension characteristics of the test flume to be representative of, or to conservatively estimate, actual plant conditions. The guidance related to crediting debris settlement states that fibrous debris "fines" should be readily suspended (or should be individual fibers), so that they are more likely to be transported to the strainer. Typically, a computational fluid dynamics (CFD) analysis is used to understand the flow and turbulence around the strainer. The CFD results for the test flume are compared against the plant flow and turbulence conditions to ensure they are similar.

As part of the NRC staff review of licensee Generic Letter 2004-02 supplemental responses, the NRC staff determines the appropriateness of licensee tests involving significant debris settlement and engages these licensees if concerns are identified with the prototypicality of the tests. Because of the unique plant-specific design and testing attributes, the NRC staff will address these issues on a plant-specific basis. If licensees perform additional testing to address these concerns, the NRC staff will review and provide feedback regarding their test procedures and protocols to ensure the plant-specific tests conservatively estimate or demonstrably represent plant conditions, including any consideration of debris settlement.

Concerning in-vessel downstream effects testing, the NRC staff is providing guidance in the form of feedback to the Pressurized Water Reactors Owners Group (PWROG) regarding their test procedures, protocols, and conditions, as well as providing feedback during observations of actual tests. These interactions should ensure the PWROG testing properly represents the range of plant conditions (e.g., debris characteristics, size distribution, and loading). The test conditions, and justifications for conditions not addressed by the testing, will be presented in a future revision of the PWROG topical report, which will be the subject of NRC staff review in the first half of 2009. The NRC staff understands that the PWROG will be relying on tests that represent a hot-leg break and that the PWROG will provide additional information to demonstrate that these break conditions bound the effects associated with cold-leg breaks. The NRC staff will evaluate the PWROG topic report to ensure it properly addresses in-vessel downstream effects.

The NRC safety evaluation will address the appropriateness and limitations of the tests described in the PWROG topical report to plant-specific conditions. Licensees who are unable to demonstrate that the PWROG test conditions bound their facilities will need to provide plant-specific information regarding in-vessel downstream effects to show effective core cooling. If plant-specific testing is necessary to address this technical area, the NRC staff will provide guidance in the form of feedback to the licensees regarding their test procedures and protocols to ensure the plant-specific tests are conservative or demonstrably representative of plant conditions.

The NRC staff appreciates the Committee's continued interest and insight regarding GSI-191. These insights are a valuable contribution to the NRC staff's development of appropriate guidance and final resolution of GSI-191.

Sincerely,

/RA Martin Virgilio for/

R. W. Borchardt
Executive Director
for Operations

cc: Chairman Klein
Commissioner Jaczko
Commissioner Lyons
Commissioner Svinicki
SECY

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The NRC staff appreciates the Committee's continued interest and insight regarding GSI-191. These insights are a valuable contribution to the NRC staff's development of appropriate guidance and final resolution of GSI-191.

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