January 14, 2010

MEMORANDUM TO: Eric J. Leeds, Director
Office of Nuclear Reactor Regulation

Michael R. Johnson, Director
Office of New Reactors

FROM: Brian W. Sheron, Director ***/RA/***
Office of Nuclear Regulatory Research

SUBJECT: IMPENDING PUBLICATION OF NUREG/CR-6995, "SCDAP/RELAP5 THERMAL-HYDRAULIC EVALUATIONS OF THE POTENTIAL FOR CONTAINMENT BYPASS DURING EXTENDED STATION BLACKOUT SEVERE ACCIDENT SEQUENCES IN A WESTINGHOUSE FOUR-LOOP PWR"

I am forwarding for your information the enclosed final version of NUREG/CR-6995, "SCDAP/RELAP5 Thermal-Hydraulic Evaluations of the Potential for Containment Bypass During Extended Station Blackout Severe Accident Sequences in a Westinghouse Four-Loop PWR," that the Office of Nuclear Regulatory Research (RES) will submit for publication in 2 weeks. In support of the Steam Generator Action Plan, RES has completed the tasks related to the timing of severe-accident induced primary system failures in a generic pressurized-water reactor (PWR) during postulated station blackout scenarios. This work was completed in coordination with the Office of Nuclear Reactor Regulation (NRR) and the Office of New Reactors (NRO) staff, and the results have been transmitted previously to NRR and NRO. The enclosed Information Systems Laboratory (ISL) NUREG/CR report includes a summary of all the thermal-hydraulic system code results that have been completed in Section 3.4 of the steam generator action plan. A brief summary is outlined below. The ISL report was peer reviewed by experts in the field including the NRR staff from the Division of Component Integrity and the Division of Safety Systems, and the NRO staff from the Division of Safety Systems and Risk Assessment. All reviewers' comments have been addressed.

The enclosed report provides a final document that summarizes all of the system code work completed along with the results and lessons learned. The report focuses on the severe accident behavior of a Westinghouse PWR during station blackout scenarios. A series of unlikely events and conditions are assumed to ensure that the plant enters a "high-dry-low" state where reactor coolant system boundary ruptures may occur.

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The high-dry-low plant condition refers to high primary side pressure along with a dried-out steam generator that is at low pressure. The following basic assumptions were used for many of the analyses to ensure the plant simulations resulted in high-dry-low conditions:

- No operator actions.
- Reactor coolant pump seal leakage: 1.32 L/s [21 gpm] (equivalent hole size).
- Failure in the steam generator (SG) pressure boundary (depressurized SGs).
- Failure of the turbine-driven auxiliary feedwater system to operate.
- Loss of offsite power for an extended period.
- Failure of all diesel-electric generators to start.

The analyses do not represent best-estimate plant behavior, and the results do not indicate the most likely outcomes of the event sequences. This is because several systems or operator actions can eliminate one or more of the high, dry, or low conditions. Many of these actions have been considered in sensitivity studies. The predictions provide insights into what variables or factors affect the induced failures. These predictions demonstrate the impact of operator actions and safety systems to reduce or eliminate the risk of induced tube failures. The report documents the thermal-hydraulic portion of the Steam Generator Action Plan.

RES has established an on-line quality survey to collect feedback from User Offices on the usefulness of RES products and services. The URL for this survey is sent by the RES Branch Chief responsible for this product/service to (his/her) counterpart(s) in your Office via email. I would appreciate it if you would see that this short -- approximately 5 minutes -- survey is completed by the responsible manager or supervisor, giving your Office's views of the delivered RES (product/service), within the next 10 working days.

If you have any questions concerning the impending issuance of this report, please contact Kenneth Armstrong or Christopher Boyd of my staff at (301) 251-7551 or (301) 251-7525, respectively.

Enclosure:
As stated

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