January 23, 2013

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

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

SUBJECT: CLOSEOUT OF USER NEED REQUEST NRR-2011-006, "TECHNICAL SUPPORT OF THE OFFICE OF NUCLEAR REACTOR REGULATION RISK ASSESSMENT OF LICENSEES' USE OF CONTAINMENT ACCIDENT PRESSURE TO PROVIDE ADEQUATE NET POSITIVE SUCTION HEAD FOR EMERGENCY CORE COOLING SYSTEM AND CONTAINMENT HEAT REMOVAL SYSTEM PUMPS"

The Office of Nuclear Regulatory Research (RES) is pleased to inform the Office of Nuclear Reactor Regulation (NRR) that RES has completed the work related to user need request (UNR) NRR-2011-006, dated May 4, 2011, for technical support of NRR's risk assessment of licensees' use of containment accident pressure (CAP) to provide adequate net positive suction head (NPSH) for emergency core cooling system (ECCS) and containment heat removal system (CHRS) pumps. The UNR is available in the Agencywide Documents Access and Management System under accession number ML110330244.

One of the purposes of this UNR was to formally document the CAP risk assessments that RES performed in 2009 and 2010 for two boiling-water reactors (BWRs) with Mark I containments, Browns Ferry and Monticello. These risk assessments used an internal event PRA model to produce an estimate of the change in core damage frequency (CDF) if CAP was not credited. The UNR also requested estimates of the risk associated with CAP credit for pressurized-water reactors (PWRs) and for BWRs with other containment designs, considering important differences in containment performance. Risk assessments of similar scope were planned for six additional reactor plants covering a spectrum of plant designs.

Throughout the course of performing this work a key issue was if it was necessary to determine values for PWR containment leakage rates that would defeat CAP (i.e. render inadequate NPSH) or result in a large early release. Existing industry risk assessments provided values of such leakage rates only for BWRs with a Mark I containment. Additional NRC thermal-hydraulic analyses would therefore have been required for the other containment types to be analyzed.

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It was subsequently agreed by NRR and RES staff that the significant NRC resources required for additional thermal-hydraulic analyses were not warranted since the removal of CAP credit was found to increase CDFs by values around or below $1x10^{-5}$ per year for those plants studied. As such, the final deliverable only includes the PRAs for the four plants that had been analyzed and documented to date (i.e., Browns Ferry, Monticello, Beaver Valley, and Fort Calhoun). It was also agreed that the risk assessments for the two PWRs—Beaver Valley and Fort Calhoun—would assume the same containment leakage rates as were used for the BWRs for defeating CAP or producing a large early release, despite the highly conservative nature of the assumption. It should be noted that this was a research study and the analytical approach has not been accepted or endorsed by the NRC for any other purpose.

The results in the enclosed report are presented in terms of the increase in CDF and Large Early Release Frequency (LERF) if CAP credit is removed, as a function of the surveillance test interval (STI) for containment leakage. As expected, as STI increases, the likelihood of a loss of containment integrity increases and correspondingly the change in CDF and LERF increases.

Although not originally planned for, during the course of technical discussions between NRR and RES staff it was concluded that RES should provide some perspectives on the potential uses of the results of this study. As such, Section 3 of the report details these perspectives, which are summarized here. With respect to risk-informed license amendment requests, licensees are expected to follow the guidance in Regulatory Guide (RG) 1.174, “An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis,” and the staff will use Section 19.2 of the Standard Review Plan (SRP) to guide its review. With respect to non-risk-informed license amendment requests, licensees and the staff should consider the guidance provided in Section 19.2, Appendix D, of the SRP as well as evaluating the changes relative to the safety principles and integrated decisionmaking process defined in RG 1.174. However, with respect to the implications for plant licensing bases due to the estimates provided in this report, it should be noted that: (1) when comparing these changes to existing regulatory guidance, the numerical risk acceptance guidelines in RG 1.174 are not requirements and do not constitute a definition of adequate protection; (2) the applicability of these estimates to any specific non-risk-informed license amendment request must first be established; and (3) uncertainties in the analyses must be considered.

The enclosed final deliverable for this user need request is a report that includes the risk assessments, and the documentation thereof, for Browns Ferry, Monticello, Beaver Valley, and Fort Calhoun. The closeout of this user UNR has been coordinated with Steven Laur, NRR, and all NRR comments on this report have been addressed by RES staff to NRR’s satisfaction.

RES has established an online quality survey with which user offices can evaluate the usefulness of RES products and services. This survey can be found at http://portal.nrc.gov/edo/res/OfficeWide/RESQualitySurvey/Lists/RES%20Quality%20Survey/NewForm.aspx?Source=http://portal.nrc.gov/edo/res/OfficeWide/RESQualitySurvey/default.aspx. If your office has not yet completed this brief survey, I would appreciate your support in ensuring its completion (which will take about 5 minutes) within the next 10 working days.

Enclosure:
As stated

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