

August 12, 2002

MEMORANDUM TO: Samuel J. Collins, Director  
Office of Nuclear Reactor Regulation

FROM: Ashok C. Thadani, Director *Original signed by A. Thadani*  
Office of Nuclear Regulatory Research

SUBJECT: RES RESPONSE TO NRR USER NEED REQUEST ON SEVERE  
ACCIDENT REVIEW FOR WESTINGHOUSE AP-1000 DESIGN  
CERTIFICATION REVIEW

In your memorandum dated June 27, 2002, the Office of Nuclear Reactor Regulation (NRR) requested the assistance of the Office of Nuclear Regulatory Research to support the Probabilistic Safety Assessment Branch (SPSB), NRR with the Westinghouse AP-1000 design certification review of severe accident (SA) issues.

Specifically, RES will provide the requested support in (1) performing MELCOR analyses of selected risk-dominant accident sequences, and (2) evaluating applicability of the conclusions from the AP-600 Fuel-Coolant Interaction review, both in-vessel and ex-vessel, to AP-1000. The MELCOR analyses will include sensitivity studies of key parameters affecting in-vessel retention (such as CHF correlations), postulated core-concrete interaction, and impacts of the non-safety related containment spray system on containment behavior (i.e., H<sub>2</sub> combustion, pressure and source terms). Additionally, we will consult with and provide support to NRR on an as-needed basis during the review process, especially in the areas of accident progression, source term evaluation, and potential challenges to the containment resulting from the selected severe accident scenarios.

During the review of the AP600 containment, the ACRS expressed concerns regarding several thermal-hydraulic processes with high uncertainty, including stratification and mixing, condensation in the presence of non-condensables, and film coverage by the Passive Containment Cooling System (PCCS). Even though they were acceptably bounded in the AP600 analysis, the understanding of these complex phenomena could be improved considerably. RES intends to investigate these processes more thoroughly, and provide a more realistic assessment of the AP1000 containment response to hypothetical accidents. As part of this investigation we will consider the effect of "hot spots" on the containment shell, stratification and mixing, and disruptions in the PCCS film coverage.

SPSB staff and RES staff have reviewed the list of requested support items and have agreed to the scope and schedule. The necessary contractor support for this work has been initiated, and we hope the procurement can be completed by the end of July 2002. As noted in your letter, the completion of the tasks is subject to completion of procurement of contractor support and the receipt by NRR of additional information from Westinghouse in a timely manner. RES staff will work closely with SPSB staff to support NRR review of AP-1000 design certification.

CONTACT:  
Richard Lee, RES/DSARE/SMSAB 301-415-6795

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