

May 31, 2001

Mr. Michael M. Corletti
Advanced Plant Safety & Licensing
Westinghouse Electric Company
P.O. Box 355
Pittsburgh, Pennsylvania 15230-0355

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE AP1000
PRE-APPLICATION REVIEW

Dear Mr. Corletti:

By letter dated May 4, 2001 (DCP/NRC 1477), Westinghouse submitted WCAP-15644, "AP1000 Code Applicability Report," for NRC review. Based on the NRC staff's initial evaluation of the information supplied, we have the following questions about Passive Containment Cooling and its analysis using WGOTHIC. In order for the staff to complete its review, please provide responses to the questions in the enclosure to this letter.

Sincerely,

/RA/

Alan C Rae, AP1000 Project Manager
Future Licensing Organization
Office of Nuclear Reactor Regulation

Project No. 711

Enclosure: Request for Additional
Information

cc w/encl: See next page

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Request for Additional Information

Related to WCAP-15644, Section 5

WGOTHIC Code Applicability for AP 1000 Containment Analysis

- P5. (p 5.7) It is stated that the examination of the Phenomena Identification and Ranking Table (PIRT) did not identify new phenomena. Was boiling on the outside of the shell considered? If not, why not, since it will occur for the AP1000, but not for the AP600.
- P6. (p 5-7) The statement is made that "The Large Scale Test (LST) was well scaled for steady-state." This is an overstatement. Where a similar statement was made on page 4-76 of WCAP-15613, *AP1000 PIRT and Scaling Assessment*, this is qualified by:- "component level distortions in the LST were addressed by using local measurements of temperature, concentration and velocity from the LST in the quasi-steady-state phase. Therefore, the steady-state LST data was determined to be acceptable for use as a source of separate effects data for water coverage and internal condensation." However, our previous evaluation set out in the Safety Evaluation Report (SER) (NUREG-1512, Vol. 2, Section 21.6.5.5.4.3) is that the LST data was considered to be of little use in directly validating WGOTHIC from a system perspective, though use of the LST data was considered acceptable to validate the conservative multipliers for local conditions correlations. The SER did not state that the LST was well scaled for steady-state. Please provide justification for your claim.
- P7. (p 5-7) It is stated that the test data for the riser region of the annulus covered the Grashof (Gr) and Reynolds (Re) numbers for the upper range for the AP1000. Table 4.2-2 of WCAP-15613 confirms that it does for the riser, but not for the chimney. The chimney Gr is 2 orders of magnitude greater than the data, while the Re is an order of magnitude greater. Also, did the riser Re and Gr consider added steam/droplets from boiling and evaporation, or only the air flow?
- P8. (p 5-8) It is stated that the maximum heat flux range is covered by the data. In the boiling mode the heat flux will be very high. Please explain why you consider that the data covers this range. Only limited and qualitative water film formation testing was performed at surface boiling conditions (using the six foot long Flat Plate Test facility). No quantitative data at high surface temperatures, typical of boiling conditions was used to derive the conservatism factors for the WGOTHIC heat and mass transfer correlations.
- P9. The staff requests that Westinghouse provide the results of calculations of the limiting loss-of-coolant accident (LOCA) and the limiting main steam line break accident done with the approved model. In particular, provide plots vs. time of the pressure, containment atmosphere temperature, mass and energy release and heat transfer coefficients on the inside and outside the containment.

Enclosure

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