October 23, 2001

Mr. Michael M. Corletti
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P.O. Box 355
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SUBJECT: AP1000 PRE-APPLICATION REVIEW - REQUEST FOR ADDITIONAL INFORMATION

Dear Mr. Corletti:

Enclosed are further Request for Information (RAIs) which have arisen from our continued work on the AP1000 pre-application review.

If you have any questions please contact me at 301-415-1308.

Sincerely

/RA/

Andrzej Drozd, AP1000 Project Manager
New Reactor Licensing Project Office
Office of Nuclear Reactor Regulation

Project 711

Enclosure: Request for Additional Information

cc w/encl: See next page

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DATE	10/18/2001	10/18/2001	10/22/2001

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Distribution for Request for Additional Information dated October 23, 2001

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P70. The AP1000 small break loss-of-coolant accident (SBLOCA) Phenomena Identification and Ranking Table (PIRT) does not include a potential phenomenon of condensation-induced water hammer (CIWH) in the Direct Vessel Injection (DVI) line during the early part of the Automatic Depressurization System (ADS) stages 1-2-3 blowdown. A CIWH could occur when cold Core Makeup Tank (CMT) or accumulator water contacts a low-velocity, stratified steam-water mixture in the DVI line.

A. Provide a revised SBLOCA PIRT with the addition of, among others, the CIWH phenomenon and associated importance ranking. Provide the basis of its ranking.

B. If the CIWH in the DVI lines is determined to be an important phenomenon, provide an evaluation of available test data, test facility scaling assessment, and the modeling of the phenomenon in the analysis code and its validation.

P71. In Section 4.1.2.4, "ADS-IRWST Transition," of WCAP-15613, Westinghouse concluded, based on the top-down scaling analysis of CMT and in-containment refueling water storage tank (IRWST) injection (Sec. 4.1.2.4.1), that (1) the OSU [Oregon State University] and SPES [Simulatore per Esperienze di Sicurezza] facilities are acceptably scaled to AP600 and AP1000 for ADS-4 critical flow and with respect to core power, and therefore can be used for code validation while ADS-4 flow is choked, and (2) when ADS-4 flow is non-critical, only OSU test data can be used for code validation as SPES is distorted due to the oversized ADS-4 vent path. In the bottom-up scaling analysis (Sec. 4.1.2.4.2), Westinghouse concluded that for hot leg flow pattern, OSU is well scaled to AP600 and AP1000, and that SPES is distorted.

However, the staff's preliminary top-down scaling analysis indicated that both Rig of Safety Assessment (ROSA) and SPES are appropriately scaled for AP1000, but not the OSU's Advanced Plant Experiment (APEX). Since the AP1000 has higher core power density than the AP600, it would have higher steam flow in the upper plenum and hot legs, thus higher liquid entrainment in the hot legs and ADS-4, during the ADS-4 blowdown. Since the AP600 and APEX did not show significant entrainment during the ADS-4 blowdown, the AP600 code validation using the APEX results during this phase of transient would be unacceptable for the AP1000 application.

A. Will Westinghouse perform the AP1000 code validation using appropriate SPES or ROSA test data of ADS-4 blowdown? Will this code validation be performed as a part of the Phase 3 design certification application? If not, what is the basis for the acceptability of the AP600 code validation for application to the AP1000?

B. Will Westinghouse obtain additional hot leg entrainment data during ADS-4 blowdown for the AP1000 code validation? If yes, describe how, where and when the additional test data will be obtained. If not, describe the basis for not requiring additional data.

P72. On page 1.11-2 of WCAP-14807 it was concluded that the NOTRUMP passive residual heat removal (PRHR) model contains a model deficiency that needs to be monitored to assure that excess PRHR heat transfer is not calculated. This is because the NOTRUMP code does not model the thermal plume in the IRWST that would occur from extended operation of the PRHR heat exchanger (HX). For AP1000 the heat flux from the PRHR HX will be greater than for AP600 and therefore more likely to produce a thermal plume in the IRWST. Page 1.13-2 of WCAP-14807 states that for PRHR HX flow velocities greater than about 1.5 ft/sec, the heat transfer from the PRHR will be overpredicted because the secondary-side heat transfer coefficient is overpredicted. The flow velocity within the PRHR HX tubes of AP1000 may exceed 1.5 ft/sec under natural circulation conditions since the resistance to flow in the inlet and exit lines to the PRHR has been reduced. The NRC staff's SER for AP600 (NUREG-1512) concludes that the NOTRUMP PRHR model is acceptable because the PRHR HX heat transfer calculated by NOTRUMP for SPES and OSU tests is lower than that measured in the experiments. The PRHRs for the SPES and OSU test facilities were scaled for AP600 which has lower flow velocities and heat fluxes than does AP1000. Justify that the PRHR HX heat transfer model is conservative for modeling AP1000 by comparing the NOTRUMP predictions for AP1000 with appropriate experimental data.

P73. Similar to NOTRUMP, the LOFTRAN code also models the IRWST as one node. LOFTRAN also does not model the thermal plume that would occur in the IRWST from extended operation of the PRHR HX. LOFTRAN uses the average IRWST temperature to determine heat flow between the PRHR HX and the IRWST. Considering that elevated IRWST local temperatures could occur in the region of the PRHR HX, justify that LOFTRAN will conservatively calculate PRHR heat flow for the AP1000 transients and accidents listed in Chapter 2.1 of WCAP14307.

P74. Since the boron concentration of the coolant injected into the RCS in the AP1000 is higher than that for AP600 (2600 vs. 2200 ppm), the potential for boric acid precipitation is greater in the AP1000. Current plants are equipped with hot and cold side injection capabilities, which enable the core and lower plenum to be flushed of excess boron. Please describe how excess boron build-up and precipitation will be prevented in the AP1000. In addition, provide information showing that boric acid crystals from boric acid entrained in droplets from the core and hot legs will not sufficiently collect on the ADS valves and piping structures to compromise their intended functions.

AP 1000

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