

May 29, 2003

Mr. W. E. Cummins, Director
AP600 & AP1000 Projects
Westinghouse Electric Company
P.O. Box 355
Pittsburgh, PA 15230-0355

Dear Mr. Cummins:

As you are aware, the U. S. Nuclear Regulatory Commission (NRC) staff is preparing the draft safety evaluation report (DSER) for the AP1000 design certification application submitted by Westinghouse Electric Company (Westinghouse) on March 28, 2002. The staff expects to issue the DSER in June, 2003. As of this date, the staff has identified two potential open items for DSER Chapter 15, "Transient and Accident Analyses" which are enclosed for your information. Please note that the staff's review of the application will continue during preparation of the DSER, which may result in changes to the potential open items identified in the enclosure, or the addition of other open items.

The two potential open items in the enclosure have the original request for additional information (RAI) number included for reference. If the staff cannot resolve the potential open items before the issuance of the DSER, these items will be issued as DSER open items and be tracked with a corresponding open item number.

Previously, Westinghouse committed to provide responses to all identified open items within 9 weeks after the issuance of the DSER. The staff will be prepared to review your responses to the open items and have conference calls and meetings with your staff, as appropriate, after the DSER is issued. If Westinghouse chooses to address some or all of these open items before the issuance of the DSER, the staff may not have sufficient time to evaluate every response to the potential open items that Westinghouse submits to the NRC and make changes to the DSER before the scheduled DSER issuance in June, 2003.

Please contact one of the following members of the AP1000 project management team if you have any questions or comments concerning this matter: Mr. John Segala (Lead Project Manager) at (301) 415-1858 or jps1@nrc.gov, Mr. Joseph Colaccino at (301) 415-2752 or jxc1@nrc.gov, or Ms. Joelle Starefos at (301) 415-8488 or jls1@nrc.gov.

Sincerely,

/RA/

James E. Lyons, Director
New Reactor Licensing Project Office
Office of Nuclear Reactor Regulation

Docket No. 52-006

Enclosure: As stated

cc: See next page

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**Westinghouse AP1000
Draft Safety Evaluation Report
Potential Open Items
Chapter 15
Transient and Accident Analyses**

Open Item Number: 15.1.5-1

Original RAI(s): 440.002, 440.062

Summary of Issue: Westinghouse has issued three Nuclear Service Advisory Letter (NSAL), NSAL-02-3 and revision 1, NSAL-02-4 and 02-5, that document the problems with the Westinghouse-designed SG water level setpoint uncertainties. NSAL-02-3 and its revision, issued on February 15 and April 8, 2002, respectively, deal with the uncertainties caused by the mid-deck plate located between the upper and lower taps used for SG level measurements. These uncertainties affect the low-low level trip setpoint (used in the analysis for events such as the feedwater line break (FLB), ATWS and steam line break). NSAL-02-4, issued on February 19, 2002, deals with the uncertainties created because the void contents of the two-phase mixture above the mid-deck plate are not reflected in the calculation and affect the high-high level trip setpoint. NSAL-02-5, issued on February 19, 2002, deals with the initial conditions assumed in the SG water level related safety analysis. The safety analysis may not be bounding because of velocity head effects or mid-deck plate pressure differential pressure that have resulted in significant increases in the control system uncertainties. In RAI 440.062 the staff requested the applicant to discuss: (1) how the AP1000 design accounts for all these uncertainties documented in these advisory letters in determining the SG water level setpoints, and (2) the effects of the water level uncertainties on the analyses of the LOCA and non-LOCA transients and the ATWS event.

The applicant response to RAI 440.002 stated that measurement uncertainties for the reactor protective system and engineered safety features actuation system instrument can be determined only when actual instrumentation is selected for the plant. The plant specific setpoint calculations will be completed and reviewed as part of the COL. The COL applicants referencing the AP1000 certified design will provide a calculation of setpoints for protective functions consistent with the methodology discussed in WCAP-14605, "Westinghouse Setpoint Methodology for Protective Systems, AP600." The methodology can be used for performing setpoint studies independent of the hardware used for the protection system, and therefore is applicable to the AP1000. The setpoint study will include applicable uncertainties discussed in the referenced NSAL. Using the methodology in WCAP-14605, plant

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nominal setpoints are calculated by adding the channel allowance from the setpoint study to the setpoint used in the safety analysis.

The COL applicant should perform plant-specific safety analysis to confirm the validity of the safety analysis documented in the AP1000 DCD using plant-specific setpoints and instrument uncertainties, including the SG mid-deck plate level measurement uncertainties. The COL applicants should submit in the plant specific applications the setpoint analysis and the associated safety analysis for the staff to review and approve. This is COL Action Item 15.1-1 and Open Item 15.1.5-1.

Open Item Number: 15.1.5-2

Original RAI(s): 440.091

Summary of Issue: With regard to the boron precipitation issue, the results presented in DCD transient analysis (1) did not quantify the amount of water exiting the vessel; (2) there was no clear indication of void distribution in the core; (3) did not characterize the water-steam mixture flow regime in the ADS-4; and (4) did not minimize the steam velocity through the ADS-4. At the staff's request, the applicant presented a more conservative case by assuming that all ADS-4 valves are open and the containment pressure is at a maximum. In addition, the applicant presented a qualification of the WCOBRA/TRAC model regarding ADS-4 water-steam flow (RAI responses to 440.091, Revision 1). The staff reviewed this information and (as stated above) found that there is adequate justification for the WCOBRA/TRAC ADS-4 flow model. The applicant demonstrated that the flow regime is the same as in AP600 (annular flow) which would entrain fluid particles to expel water from the vessel as required to avoid boron concentration in the vessel and/or precipitation. The amount of water to be removed from the core was quantified. In addition, literature was cited regarding flow regimes applicable to the conditions of the ADS-4 which reinforced the credibility of the results.

However, the applicant did not present a detailed enough case regarding void distribution in the core. Persistent voiding in the core could result into adiabatic heating of the fuel. This is Open Item 15.2.7-1.

AP 1000

cc:

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