



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

June 1, 1994

Locket No. 52-003

Mr. Nicholas J. Liparulo  
Nuclear Safety and Regulatory Activities  
Westinghouse Electric Corporation  
P.O. Box 355  
Pittsburgh, Pennsylvania 15230

Dear Mr. Liparulo:

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION ON THE AP600

As a result of its review of the June 1992 application for design certification of the AP600, the staff has determined that it needs additional information in order to complete its review. The additional information is needed in the areas of reactor systems (Q440.169-Q440.172)\* and testing (Q952.89). Enclosed are the staff's questions. Please respond to this request on a schedule that will support development of the November 1994 draft final safety evaluation report on the AP600 design.

You have requested that portions of the information submitted in the June 1992 application for design certification be exempt from mandatory public disclosure. While the staff has not completed its review of your request in accordance with the requirements of 10 CFR 2.790, that portion of the submitted information is being withheld from public disclosure pending the staff's final determination. The staff concludes that this request for additional information does not contain those portions of the information for which exemption is sought. However, the staff will withhold this letter from public disclosure for 30 calendar days from the date of this letter to allow Westinghouse the opportunity to verify the staff's conclusions. If, after that time, you do not request that all or portions of the information in the enclosures be withheld from public disclosure in accordance with 10 CFR 2.790, this letter will be placed in the NRC's Public Document Room.

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\*The numbers in parentheses designate the tracking numbers assigned to the questions.

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Mr. Nicholas J. Liparulo

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This request for additional information affects nine or fewer respondents, and therefore, is not subject to review by the Office of Management and Budget under P.L. 96-511.

If you have any questions regarding this matter, you can contact me at (301) 504-1120.

Sincerely,

(Original signed by)

Thomas J. Kenyon, Project Manager  
Standardization Project Directorate  
Associate Directorate for Advanced Reactors  
and License Renewal  
Office of Nuclear Reactor Regulation

Enclosure:  
As stated

cc w/enclosure:  
See next page

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Mr. Nicholas J. Liparulo  
Westinghouse Electric Corporation

Docket No. 52-003  
AP600

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REQUEST FOR ADDITIONAL INFORMATION  
ON THE WESTINGHOUSE AP600 DESIGN

REACTOR SYSTEMS

- 440.169 As discussed in various subsections in Section 6.3.2.2 of the SSAR, each injection line of the CMTs, the accumulators, and the IRWST contains a flow-tuning orifice that provides a mechanism for the field adjustment of the injection line resistance, and is used to establish the required flow rate for the associated plant conditions. Connections are provided for remotely adjusting the boron concentration of the borated water in each CMT, accumulator, and the IRWST during normal plant operation, as required.
- a. Describe how, when, and to what criteria the boron concentration will be adjusted.
  - b. Describe how, when, and to what criteria the flow-tuning orifices will be adjusted. Provide the bases for the criteria to account for LOCA and non-LOCA conditions. Discuss the safety-related aspects of these orifices.
- 440.170 Section 6.3.3.3.1 of the SSAR discusses the scenario for a single steam generator tube rupture, and states that if the non-safety-related systems fail to start, the core makeup tanks and the PRHR heat exchangers automatically actuate. The section states that during these events, the plant conditions are stabilized without actuating the ADS. Because various stages of the ADS are actuated based on the CMT levels and subsequent delay time, will the CMT maintain its level so that the ADS remain unactuated for a multiple tube rupture? If the ADS actuates, will the primary system over-depressurize, which would result in back flow of the secondary unborated water into the primary system with a subsequent reactivity increase? Although the staff agrees with the position stated in the January 22, 1993 response to Q440.27 that the multiple steam generator tube rupture (SGTR) scenario should not be a design basis event and the licensing design basis is for consideration of a single SGTR, the staff is concerned with a multiple SGTR scenario for a passive PWR. Therefore, provide a realistic analysis of the rupture of 3 to 5 steam generator tubes.

Enclosure

- 440.171 To address the concern of increasing the potential for operator error as a result of added displays and controls in the control room of the high point vent systems, Section 5.4.12 of the SRP states that a human-factor analysis should be performed taking into consideration the use of this information by an operator during both normal and abnormal plant conditions, integration into emergency procedures and operator training, and other alarms during emergency and need for prioritization of alarms. Confirm that the displays and controls of the high point vent will be included as part of this human-factor analysis in the design of the displays and controls in the control room.
- 440.172 Item (2)(vi), "Reactor Coolant System High Point Vents," of Section 1.9 of the SSAR states that the RCS can be vented either into the pressurizer or directly from the hot legs to the containment, depending on which ADS valves are open, and that this venting process (through the hot leg and out of the RCS) will maintain a required core cooling flow without the need to refill the vessel and pressurizer.
- a. Section 5.4.12 of the SSAR indicates that only the ADS Stage 1 valves and the reactor vessel head vent valves can be used to vent noncondensable gases to the IRWST. Clarify whether other stages of the ADS can be used for venting noncondensable gases.
  - b. Verify that core cooling will be maintained without refilling the vessel, as stated in Section 1.9 of the SSAR. Describe how this will be accomplished.
  - c. Section 1.9 of the SSAR states that the remainder (other than the associated valves, piping, and quality groups mentioned) of the reactor head vent system piping and equipment connected to the IRWST is considered non-nuclear safety. Address why they are not considered safety-related piping and equipment.

#### TESTING

- 952.89 The staff has reviewed the revised test matrix for the Core Makeup Tank (CMT) facility, in view of both recent AP600 design changes and the results from the integral systems tests in the ROSA and SPES-2 facilities. The staff understands that the reasons for eliminating tests pertaining to behavior related to the pressurizer pressure balance line. However, the rationale for the tests added in series "500" is not entirely clear. Please address the following concerns:
- a. Explain why a series of tests has been added with a starting pressure of 1835 psig.
  - b. Recent results from the integral systems tests indicate that CMT draining and subsequent initiation of the automatic depressurization system may occur at substantially lower

pressures than previously anticipated, largely as a result of early actuation of the passive residual heat removal system. Preliminary data from SPES-2 test S00303 show that first stage ADS was actuated at a system pressure of about 650 psia, while in ROSA test AP-CL-03, ADS stage 1 opened at an even lower pressure, close to 500 psia. There is currently insufficient data to determine precisely at what pressure the tank began to drain in these tests, but it appears that draining started at pressures about 100-200 psi higher than ADS actuation pressure. The pressure at ADS actuation is a function of the rate of energy removal from the primary system through the break, PRHR system, and CMT recirculation, and would be expected to vary. Under the circumstances, the staff recommends that Westinghouse evaluate the integral test data, and add tests similar to 507-509 to the CMT matrix, at relatively low pressures (between perhaps 400 and 800 psia), consistent with integral test results.