Docket File

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

December 19, 1996

Mr. Nicholas J. Liparulo, Manager
Nuclear Safety and Regulatory Analysis
Nuclear and Advanced Technology Division
Westinghouse Electric Corporation
P.O. Box 355
Pittsburgh, Pennsylvania 15230

SUBJECT: FOLLOWON QUESTIONS AND DISCUSSION ITEMS ON THE AP600 INITIAL TEST PROGRAM (ITP)

Dear Mr. Liparulo:

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. Specifically, the enclosure to this letter contains a request for additional information and discussion items concerning the AP600 ITP. We propose that the enclosed discussion items serve as agenda items for a currently unscheduled meeting concerning the ITP. During this meeting the staff will determine which of the enclosed discussion items need to be formally addressed by Westinghouse.

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 these followon questions do 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 Nuclear Regulatory Commission Public Document Room.

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If you have any questions regarding this matter, you may contact me at (301) 415-1132.

Sincerely,

original signed by:

Joseph M. Sebrosky, Project Manager
Standardization Project Directorate
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Docket No. 52-003

Enclosure: As stated

cc w/enclosure:
See next page

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Docket No. 52-003
AP600

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Request for Additional Information and Discussion Items on the AP600 ITP

Although the Nuclear Regulatory Commission (NRC) staff does not anticipate finalizing its review of SSAR Chapter 14, Initial Test Program (ITP), before the end of February 1997, there are certain technical issues, related primarily to testing of safety-related passive systems, that the staff feels must be addressed by Westinghouse as soon as possible to avoid the possibility of schedule conflicts, to identify the potential need of additional interactions as a result of proposed solutions to such issues, and to expedite or enhance the overall review process whenever possible. To this end, the staff has decided to forward to Westinghouse the following request for additional information (RAI) and Discussion Items on the AP600 ITP.

Request For Additional Information on the AP600 ITP

260.90 § 52.47(a)(1)(i) requires, in part, that an application for design certification contain the technical information which is required of applicants for construction permits and operating licenses by 10 CFR Part 50 and its appendices. § 50.34, Appendix A to 10 CFR Part 50, and Section XI, "Test Control," of Appendix B to 10 CFR Part 50 require that a test program be established to ensure that structures, systems, and components will perform satisfactorily in service. § 50.34 also requires, in part, that the applicant include plans for preoperational testing and initial operations in the final safety analysis report (FSAR). Chapter 14 of Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants," provides guidance on the information pertaining to initial test programs to be included in both the preliminary safety analysis report (PSAR) and the FSAR for the NRC staff to perform its safety evaluations for construction permits and operating licenses. Regulatory Guide 1.68, Initial Test Programs for Water-Cooled Nuclear Power Plants" describes the general scope and depth of initial test programs acceptable to the NRC staff for light-water-cooled nuclear power plants. Section B, "discussion," of RG 1.68 states, in part, the following:

(a) "The primary objectives of a suitable program are (1) to provide additional assurance that the facility has been adequately designed and, to the extent practical, to validate the analytical models and to verify the correctness or conservatism of assumptions used for predicting plant responses to anticipated transients and postulated accidents and (2) to provide assurance that construction and installation of equipment in the facility have been accomplished in accordance with design."

(b) "If new, unique, or first-of-a-kind principal design features will be used in the facility, the in-plant functional testing requirements necessary to verify their performance need to be identified at an early date to permit these test requirements to be appropriately accounted for in the final design."

(c) "Preoperational testing, as used in this guide, consists of those tests conducted following completion of construction and construction-related inspections and tests, but prior to fuel loading, to demonstrate, to the extent practical, the capability of structures, systems, and components to meet performance requirements to satisfy design criteria."

(d) "The initial test program should be designed to demonstrate the performance of structures, systems, components, and design features that will be used during normal operations of the facility and also demonstrate the performance of standby systems and features that must function to maintain the plant in a safe condition in the event of malfunctions or accidents."

(e) "To the extent practical, the plant conditions during the tests should simulate the actual operating and emergency conditions to which the structure, system, or component may be subjected. To the extent practical, the duration of the tests should be sufficient to permit equipment to reach its normal equilibrium conditions. e.g.. temperatures and pressures, and thus decrease the probability of failures, including "run-in" type failures, from occurring during plant operation."

Based on the need to demonstrate satisfactory performance of systems, structures, or components during plant conditions that simulate, to the extent practical, "the actual operating and emergency conditions to which the structure, system, or component may be subjected," the staff's position is that testing of the Passive Core Cooling System (ADS, CMT, IRWST, Accumulators, and PRHR) during the preoperational testing phase (14.2.9.1.3, "Passive Core Cooling System Testing") will not demonstrate "the capability of structures, systems, and components to meet performance requirements to satisfy design criteria."

While it is not expected that these systems/design features be tested at actual conditions representative of design, the staff believes Westinghouse should (1) modify the subject test descriptions to establish testing conditions or performance envelopes (temperature, flow, pressure, power level, etc.) necessary and sufficient to demonstrate (at conditions other than

"representative of design") the capability of the systems/design features to perform their design bases functions; and (2) conduct such testing during the power-ascension test phase (post-fuel load). In its response to this RAI Westinghouse should address these two items.

Discussion Items

Level of Detail

While the staff agrees that the function-based approach can be an acceptable alternative, the ITP as provided for the AP600 is deficient in its level of detail. The staff is also concerned that when Westinghouse made the transition to Revision 9 of the ITP relevant detail related to specific structures, systems, components or design features previously found in Revision 1 of the ITP were not "relocated" accordingly. Using the evolutionary plant ITP abstracts as a benchmark, the AP600 abstracts, in general, provide insufficient detail to guide the development of detailed test procedures for the tests. Specific examples, include:

14.2.9.1.3, "Passive Core Cooling System Testing"

1. The abstracts for safety injection system tests in the CE 80+ documentation include details on test methodology that are missing in the AP600 abstracts.

2. The CE 80+ abstracts specify as a prerequisite that any required instrumentation has been installed and calibrated. Some of the AP600 abstracts state that temporary instrumentation will or may be required to perform the required tests, but do not indicate when the instrumentation should be installed, nor that it requires calibration.

3. The CE 80+ abstracts specify the types of data that are required; this information is also not indicated for the AP600.

4. The CE 80+ abstracts contain specific reference to tests of an ECC sampling system to monitor SI chemistry and debris content. There is no indication in the AP600 ITP documentation as to whether an analogous system exists for the AP600. Since the sources of ECCS inventory are borated, the staff assumes that some means of chemistry monitoring and control is required. Similarly, because of the relctively low driving heads available for the passive SI systems, debris that could result in blockages appears also to be parameter that should be monitored. Testing of these systems should be appropriately indicated, including the types of data required. In a similar vein, the PXS test abstracts indicate that the testing includes "emergency makeup and boration function;" data to verify the makeup function are discussed (in very broad terms), but there is no guidance given as to how to verify proper operation of the boration function of these systems.

5. Passive RHR system: a test during the startup program (post-fuel loading) is needed to provide adequate assurance of system function in natural circulation. The current ITP provides only for a natural circulation test during hot functionals, with no heat source. The staff believes that a more extensive test, with a constant heat source, is required to confirm PRHR system capabilities (This item is related to RAI No. 260.90, above).

6. Some tests are indicated as being required for "first plant only." Although, conceivably, the "heatup characteristics of the IRWST water" may be necessary only for the first plant, other "first plant only" tests of the PXS should not be designated as such. These include: recirculation testing of the CMTs, and ADS 1/2/3 blowdown. For both of these systems, the staff believes that an "integral" test is valuable to determine system response characteristics that may be overlooked during the "separate-effects" type of functional testing specified in the other abstracts, and that such a test should not be restricted to the first plant.

7. It is not clear from the abstracts as written how the ADS actuation function of the CMT level instrumentation will be tested.

8. It is not clear how the pH control function can be verified simply by inspection of the trisodium phosphate baskets.

9. It is not clear from the abstracts how the functionality of the containment sump instrumentation will be demonstrated during PXS testing.

10. The original version of the ITP had an "integral" PXS test included that was designed to verify that no adverse systems interactions would occur. That test seems to have been eliminated. The staff believes that such a test should be included. Further, this test may need to include an examination of potential interactions between DID and PXS systems (such as RNS and CMTs).

14.2.9.1.1, "Reactor Coolant System Testing"

1. Pressurizer, Reactor Coolant Pumps and Pressurizer Safety Valves are major components and hence there should be separate sections for each of them. Add separate test sections for Pressurizer, Reactor Coolant pumps and Safety Valves.

2. Testing of RCP motors is excluded. Add testing of RCP motors.

3. Pressurizer heaters, pressure and control systems can be tested before the hot functional tests by simulating different conditions. Include the testing of these systems in the pre-operational tests.

Comments on Test Description Format

1. Test Method and Acceptance Criteria sections are combined. They should be separated. The Acceptance Criteria should be given separately to clearly identify the acceptance criteria.

2. It may be acceptable to refer to the pertinent SSAR section for purposes of the system description and operation, but the process parameters and other aspects should be in the individual test sections. Instead of referring to other sections of the SSAR for information, provide the necessary information in the test section itself. Most of the references are not specific and hence the relevant portion can not be located. Chapter 14 should not be a mere list of references.