

UNITED STATES NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001 May 24, 1994

Docket 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 on the initial test program for the AP600 design (Q260.23-Q260.32). Enclosed are the staff's questions. Please respond to this request by June 30, 1994, to support the staff's review of 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.

Mr. Nicholas J. Liparulo

May 24, 1994

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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OFFICIAL RECORD COPY: DOCUMENT NAME: CH 14.RAI Mr. Nicholas J. Liparulo Westinghouse Electric Corporation

cc: Mr. B. A. McIntyre Advanced Plant Safety & Licensing Westinghouse Electric Corporation Energy Systems Business Unit P.O. Box 355 Pittsburgh, Pennsylvania 15230

> Mr. John C. Butler Advanced Plant Safety & Licensing Westinghouse Electric Corporation Energy Systems Business Unit Box 355 Pittsburgh, Pennsylvania 15230

Mr. M. D. Beaumont Nuclear and Advanced Technology Division Westinghouse Electric Corporation One Montrose Metro 11921 Rockville Pike Suite 350 Rockville, Maryland 20852

Mr. Sterling Franks U.S. Department of Energy NE-42 Washington, D.C. 20585

Mr. S. M. Modro EG&G Idaho Inc. Post Office Box 1625 Idaho Falls, Idaho 83415

Mr. Steve Goldberg Budget Examiner 725 17th Street, N.W. Room 8002 Washington, D.C. 20503

Mr. Frank A. Ross U.S. Department of Energy, NE-42 Office of LWR Safety and Technology 19901 Germantown Road Germantown, Maryland 20874

Mr. Victor G. Snell, Director Safety and Licensing AECL Technologies 9210 Corporate Boulevard Suite 410 Rockville, Maryland 20850 Docket No. 52-003 AP600

Mr. Raymond N. Ng, Manager Technical Division Nuclear Management and Resources Council 1776 Eye Street, N.W. Suite 300 Washington, D.C. 20006-3706

REQUEST FOR ADDITIONAL INFORMATION ON THE WESTINGHOUSE AP600 DESIGN

- 260.23 Section 14.2.1 of the SSAR states that preoperational and/or startup testing is performed on those systems that:
 - Are relied upon for safe shutdown and cooldown of the reactor under normal plant conditions and for maintaining the reactor in a safe condition for an extended shutdown period;
 - b. Are relied upon for safe shutdown and cooldown of the reactor under transient and postulated accident conditions and for maintaining the reactor in a safe condition for an extended shutdown period following such conditions;
 - Are relied upon for establishing conformance with safety limits or limiting conditions for operation;
 - Are classified as engineered safety features actuation systems (ESFAS) or are relied upon to support operation of engineered safety features actuation systems within design limits;
 - Are assumed to function during an accident or for which credit is taken in the accident analysis and in the probabilistic risk assessment (PRA); and
 - Are used to process, store, control, or limit the release of radioactive materials.

To be consistent with the guidance of Regulatory Position (RP) C.1 of Regulatory Guide (RG) 1.68 (Rev. 2, August 1978), the staff believes that paragraphs c, d, and e above should be revised as follows:

- c. Are relied upon for establishing conformance with safety limits or limiting conditions for operation <u>that will be included in the</u> <u>facility technical specifications</u>;
- Are classified as engineered safety features actuation systems (ESFAS) or are relied upon to support <u>or ensure</u> operation of engineered safety features actuation systems within design limits;
- Are assumed to function or for which credit is taken in the accident analysis of the facility, as described in the SSAR, and/or in its design-specific probabilistic risk assessment (PRA);

Revise Section 14.2.1 of the SSAR accordingly.

In addition, Section 14.2.1 or 14.2.8 of the SSAR should be revised to identify, if applicable, any startup tests that are to be performed to demonstrate the operability of structures, systems and components that are not considered essential to meet the criteria of RP C.1 of RG 1.68 (Rev. 2, August 1978).

Enclosure

- 260.24 Revise Section 14.2.2, "Test Procedures," of the SSAR to clarify that Westinghouse will provide the COL applicant with scoping documents (i.e., preoperational and startup test specifications) containing testing objectives and acceptance criteria applicable to Westinghouse's scope of design responsibility. Such documents also should include, as appropriate, delineation of specific plant operational conditions at which the tests will be conducted, testing methodologies to be used, specific data to be collected, and acceptable data reduction techniques as well as any reconciliation methods needed to account for test conditions, methods, or results if testing is performed at conditions other than representative design operating conditions. This section (and/or others, as appropriate) should include the following combined license (COL) action items that are to be provided by the prospective COL applicant for staff review (see 0260.28):
 - The scoping document (i.e., preoperational and startup test specifications) containing testing objectives and acceptance criteria applicable to Westinghouse's scope of design responsibility;
 - b. The scoping document and any other documents which delineate plant operational conditions at which tests are to be conducted, testing methodologies to be utilized, specific data to be collected, and acceptable data reduction techniques to be utilized;
 - c. The scoping document that delineates any reconciliation methods needed to account for test conditions, methods, or results if testing is performed at conditions other than representative of design operating conditions; and
 - d. The approved preoperational test procedures approximately 60 days before their intended use and startup test procedures approximately 60 days before fuel loading.
- 260.25 The "startup administrative manual" that is described in Section 14.2.2.1 of the SSAR, "Conduct of Test Program," should be identified in this section, and in others as appropriate, as "COL License Information" (i.e., information to be supplied to the NRC by the COL applicant referencing the AP600 design) (see Q260.27).
- 260.26 Section 14.2.1, "Summary of Test Program and Objectives," Section 14.2.4, "Utilization of Reactor Operating and Testing Experience in the Development of Test Program," Section 14.2.6.3, "Power Ascension," and Section 14.2.8 of the SSAR, "Individual Test Descriptions" describe 9 preoperational tests and 8 startup tests that are to be performed only for the first AP600 plant to confirm selected design and analysis assumptions and predictions. The justification provided in Section 14.2.1 states "Because of the standardized AP600 design, it is not necessary to repeat these tests during the initial test programs for successive AP600 plants. There is no need to reconfirm the design and analysis assumptions for the successive AP600 plants."

Revise Section 14.2 to either provide a specific listing of the exceptions to corresponding Regulatory Guides (RGs) with appropriate technical justification for conducting each of these tests only on the first plant, or to commit to performing these tests on all AP600 plants. The following is a list of the tests and the corresponding RGs of concern:

- Preoperational test abstract 14.2.8.1.77, "Reactor Internals and Reactor Coolant System Vibration Test"; RG 1.20, "Comprehensive Vibration Assessment Program For Reactor Internals During Preoperational And Initial Startup Testing," RP C.3.4, Non-Prototype, Category IV.
- Preoperational test abstract 14.2.8.1.78, "Steady-State Vibration Monitoring of Safety-Related and High-Energy Piping"; RG 1.68, Appendix A, Item 1.a.(3).
- Preoperational test abstract 14.2.8.1.80, "Automatic Depressurization System"; RG 1.68, Appendix A, Item 1.a.(2)(d).
- Preoperational test abstract 14.2.8.1.82, "Dynamic Response"; RG 1.68, Appendix A, Items 1.a.(1) and (3).
- Preoperational test abstract 14.2.8.1.85, "Passive Core Cooling System"; RG 1.79, Preoperational Testing of Emergency Core Cooling Systems For Pressurized Water Reactors" and RG 1.68, Appendix A, Item 1.h.
- Preoperational test abstract 14.2.8.1.87, "Passive Residual Heat Removal System"; RG 1.139, "Guidance For Residual Heat Removal," RP C.5; and RG 1.68, Appendix A, Items 1.d.(5), and 1.d.(8).
- Preoperational test abstract 14.2.8.1.94, "Remote Shutdown"; RG 1.68.2, "Initial Startup Test Program To Demonstrate Remote Shutdown Capability For Water-Cooled Nuclear Power Plants," RP C.3 and 4.
- Preoperational test abstract 14.2.8.1.97, "Passive Containment Cooling System"; RG 1.68, Appendix A, Item 1.h.(3).
- Preoperational test abstract 14.2.8.1.100, "Main Control Room Habitability System"; RG 1.68, Appendix A, Item 1.n.(14)(f).
- Startup test abstract 14.2.8.2.20, "Dynamic Response"; RG 1.68, Appendix A, Item 5.0.0.
- Startup test abstract 14.2.8.2.34, "Natural Circulation"; RG 1.68, Appendix A, Item 4.t.
- Startup test abstract 14.2.8.2.38, "Process Measurement Accuracy Verification"; RG 1.68, Appendix A, Items 5.b and y.

- Startup test abstract 14.2.8.2.41, "Loss of Offsite Power"; RG 1.68, Appendix A, Item 5.j.j.
- Startup test abstract 14.2.8.2.47, "Rod Cluster Control Assembly Out of Bank Measurements"; RG 1.68, Appendix A, Items 4.e, 5.f, and 5.i.
- Startup test abstract 14.2.8.2.51, "100 Percent Load Rejection"; RG 1.68, Appendix A, Item 5.n.n.
- Startup test abstract 14.2.8.2.52, "Load Follow Demonstration"; RG 1.68, Appendix A, Item 5.h.h.
- Startup test abstract 14.2.8.2.55, "Plant Trip from 100 Percent Power"; RG 1.68, Appendix A, Item 5.1.1.
- 260.27 Revise Section 14.2.7, "Test Program Schedule," of the SSAR to identify the following as a COL Action Item: A COL applicant will need to provide a startup adminiscrative manual (procedures), and any other documents that delineate the test program schedule, for staff review (see Q260.25).
- 260.28 Revise Section 14.2.8, "Individual Test Descriptions," of the SSAR to reconcile its contents with that of Section 14.2.2, "Test Procedures," as discussed in Q260.24.
- 260.29 Revise Section 14.2.8, "Individual Test Descriptions," of the SSAR and the individual test methods or performance criteria to provide specific references to the basis for determining acceptable system and component performance. Appropriate references are SSAR sections, technical specifications, NRC Regulatory Guides, applicable codes and standards, and other specific references.
- 260.30 The preoperational and startup test phase descriptions in Section 14.2.8, "Individual Test Descriptions," of the SSAR do not provide assurance that the operability of several of the systems and components listed in Appendix A of Regulatory Guide 1.68 (Revision 2) will be demonstrated. The test abstracts of Section 14.2.8 should be expanded to address the following items identified in Appendix A to RG 1.68, or Section 1A of the SSAR should be revised to provide technical justification for any exceptions taken.

RG

Paragraph System/Component

- 1. Preoperational Testing
- 1.a.(2)(i) Pressurizer safety valves.
- 1.b.(1) Control rod withdrawal inhibit and rod runback functions.

- Diverse actuation system that provides protection of facility for anticipated transients without a scram (ATWS).
- 1.e.(4) Steam generator pressure safety valves.
- 1.e.(10) Feedwater heater and drains.
- 1.f.(2) Cooling towers and associated auxiliaries.
- 1.j.(7) Leak detection systems used to detect failures in ECCS and containment recirculation systems located outside containment. For example, potential leakage in normal RHR system or the post accident sampling systems that could be used to recirculate reactor coolant outside containment after an accident.
- 1.j.(8) Automatic reactor power control system and primary Taverage control system.
- 1.j.(13) Excore neutron instrumentation.
- 1.j.(17) Feedwater heater temperature, level, and bypass controls.
- 1.j.(20) Instrumentation used to detect external and internal flooding conditions.
- 1.j.(22) Instrumentation used to track the course of postulated accidents such as: containment wide-range pressure indicators, reactor vessel water level monitors, containment sump level monitors, high radiation detectors, and humidity monitors.
- 1.j.(23) Post-accident hydrogen monitors.
- 1.j.(24) Annunciators for reactor control and engineered safety features.
- 1.k.(2) Personnel monitors and radiation survey instruments. As the calibration program applied to these devices will be site specific, it would be appropriate to identify this as a COL action item.
- 1.k.(3) Laboratory equipment used to analyze or measure radiation levels and radioactivity concentrations.
- 1.1.(5) Isolation features for condenser offgas systems.
- 1.m.(4) Static load testing at 125-percent rated load of cranes, hoists, and associated lifting and rigging equipment.
- 1.n.(5) Secondary sampling systems.

- Drain systems and pumping systems serving essential areas.
- 1.n.(12) Boron recovery system.
- 1.n.(13) Communications systems relating to offsite emergency notification.
- 1.n.(14)(c) Class 1E electrical room heating, ventilating, and air conditioning.
- 1.n.(14)(f) Main Control Room: Proper operation of smoke and toxic chemical detection systems and ventilation shutdown devices, including leaktightness of ducts.
- 1.n.(15) Shield cooling systems.
- 1.o.(1) Dynamic and static load tests of reactor components handling system cranes, hoists, and associated lifting and rigging equipment.
- 1.o.(2) Protective devices and interlocks of reactor components handling system equipment.
- Safety devices for reactor components handling systems equipment.
- 2. Initial Fuel Loading and Precritical Tests
- 2.f Reactor core and other major components differential pressure and vibration testing after fuel loading.
- 4. Low Power Testing
- 4.c Pseudo rod ejection test.
- 4.i Control rod block and inhibit functions.
- 5. Power Ascension Tests
- 5.e Pseudo rod ejection test.
- 5.m Reactor core and major reactor coolant system components differential pressure.
- 5.r Process computer and control room computer.
- 5.t Pressurizer safety valves and secondary system safety valves.

- 5.c.c Include a test description for power ascension tests to demonstrate that gaseous and liquid radioactive waste processing, storage, and release systems operate in accordance with design.
- 5.g.g Design features to prevent or mitigate anticipated transients without scram (ATWS).
- 5.k.k Dynamic response of the plant for loss of feedwater heaters or bypassing feedwater heaters.
- 260.31 The preoperational and startup test phase descriptions in Section 14.2.8, "Individual Test Descriptions," of the SSAR do not provide assurance that the operability of several of the systems and components listed in the following regulatory guides will be demonstrated. The test abstracts of Section 14.2.8 of the SSAR should be expanded to address the following items, or Section 1A of the SSAR should be revised to provide technical justification for any exceptions taken.
 - a. Regulatory Guide 1.68.2, "Initial Startup Test Program To Demonstrate Remote Shutdown Capability For Water-Cooled Nuclear Power Plants" - Preoperational test abstract 14.2.8.1.94, "Remote Shutdown" does not provide sufficient detail to verify conformance with the following Regulatory Positions (RPs) of RG 1.68.2.
 - 1. Hot Standby Demonstration (RP C.3), including:
 - A. With initial conditions of the reactor at a moderate power level (10 to 25 percent) sufficiently high that plant systems are in the normal configuration with the turbine generator in operation and with the minimum shift crew;
 - B. Demonstrate using only credited remote shutdown equipment the capability to achieve hot standby status and maintain stable hot standby conditions for at least 30 minutes.
 - 2. Cold Shutdown Demonstration (RP C.4), including:
 - A. With the plant at hot standby conditions;
 - B. With the procedurally designated crew positions;
 - C. Demonstrate using only credited remote shutdown equipment the capability to perform a partial cooldown by performing the following actions:
 - Lower reactor coolant pressure and temperature sufficiently to permit operation of the RHR system;
 - (2) Initiate and control operation of the RHR system;

- Establish a heat transfer path to the ultimate heat sink,
- (4) Reduce reactor coolant temperature approximately 50°F using the DHR system.
- b. Regulatory Guide 1.68.3, "Preoperational Testing of Instrument and Control Air Systems" - Preoperational test abstract 14.2.8.1.6, "Compressed and Instrument Air Systems" does not provide sufficient detail to verify conformance with the following RPs of RG 1.68.3:
 - After coolers, oil separators, air receivers, and pressurereducing stations (RP C.2);
 - Flow, temperature, and pressure meet design specifications (RP C.4);
 - 3. Total air demand with leakage meets design (RP C.5);
 - 4. Single failure criterion (RP C.7);
 - 5. Sudden and gradual loss of system pressure and appropriate response of air-powered equipment (RP C.8);
 - Functional test for increase in the air supply system pressure does not cause loss of operability (RP C.11).
- c. Regulatory Guide 1.140, "Design, Testing, and Maintenance Criteria For Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants" - Preoperational test abstracts 14.2.8.1.28, "Containment Air Filtration System," 14.2.8.1.29, "Radiologically Controlled Area Ventilation Test," and 14.2.8.1.88, "High-Efficiency Particulate Air Filters and Charcoal Absorbers" do not provide sufficient detail to verify conformance with the following RR of RG 1.140:
 - 1. Heaters (RP C.3.a);
 - 2. Prefilters (RP C.3.m);
 - 3. HEPA filters DOP tests (RPs C.3.b and C.5.c);
 - 4. Ductwork (RP C.3.f);
 - 5. Fans and motors mounting and ductwork (RP C.3.i);
 - 6. Dampers (RP C.3.1);
 - Adsorber sections/cells and activated charcoal (RPs C.3.h and C.5.d).

260.32 The staff recommends that Section 14.2.9, "Interfaces," should be retitled as "COL License Information - Initial Test Program" to more accurately reflect its purpose within the SSAR (i.e., to identify the information contained therein as that which is to be supplied to the NRC by the COL applicant referencing the AP600 design). In addition, its content should be revised to include "site-specific aspects of the plant," such as the following systems that may require testing "to satisfy certain AP600 interface requirements": (a) electrical switchyard equipment, (b) the site security plan equipment, (c) personnel monitors and radiation survey instruments, and (d) the automatic dispatcher control system (if applicable).