Docket File

52-003

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

November 8, 1996

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

SUBJECT: COMMENTS CONCERNING THE AP600 INITIAL TEST PROGRAM (ITP)

Dear Mr. Liparulo:

Enclosed are questions and comments developed by the staff as a result of the review of an August 13, 1996, letter from Westinghouse concerning the AP600 ITP. The August 13, 1996, letter provided responses to the request for additional information and Draft Safety Evaluation Report open items for the ITP. The Westinghouse letter reflected the changes to the ITP made in Revision 9 of the AP600 Standard Safety Analysis Report (SSAR).

The enclosed comments concentrate on the RAIs that were developed as a result of the ITP review done prior to Revision 9 of the SSAR. Please note that the staff is continuing to review Revision 9 to the SSAR which substantially modified the content, format and approach for the ITP. Because of the substantial modification made to Chapter 14 it is not anticipated that the RAIs previously issued will bound all questions in this area. Therefore, it is expected that additional questions will result from the staff's continuing review of Revision 9 to the SSAR.

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 NRC's Public Document Room.

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

Sincerely,

original signed by:

Joseph M. Sebrosky, Project Manager
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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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AP600

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Comments concerning Westinghouse AP600 SSAR Chapter 14, Initial Test Program

1. Initial Staff Response to Westinghouse Letter to NRC dated August 13, 1996, on "SSAR Chapter 14 - Initial Test Program, Responses to RAIs and Open Items"

OITS 1234/DSER Open Item 14.2.1-1: "The staff finds, however, that in order to be consistent with the guidance of Regulatory Position (RP) C.1 of RG 1.68, Revision 2, dated August 1978, the third, fourth, and fifth paragraphs in Section 14.2.1 of the SSAR, regarding systems on which preoperational and/or startup testing is to be performed, should be revised as follows:

- Are relied upon for establishing conformance with safety limits or limiting conditions for operation that will be included in the facility technical specifications

- Are classified as ESFASs or are relied upon to support or ensure operation of ESFASs 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 PRA

In addition, Westinghouse should include, in this section of the SSAR (or in another Chapter 14 section, as appropriate), a detailed description of those AP600 plant-specific design features, systems (including those listed in Table 1.5-1 of the SSAR), and/or system configurations or interactions, not being tested and/or simulated within the initial test program scope of Chapter 14 of the SSAR, which meet either of the following criteria:

- are significantly different from those found in light water reactor designs described in 10 CFR 52.47(b)(1)

- utilize simplified, inherent, passive, or other innovative means to accomplish their intended safety functions.

For any such systems or design features identified, Westinghouse should provide appropriate justifications for their exclusion from the ITP, or the applicable test abstract(s) should be modified to encompass them accordingly.

The staff also finds that Section 14.2.1 (or alternatively Section 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 (Revision 2, dated August 1978).

Portions of the issues outlined above were previously identified by the staff as Q260.23. This is Open Item 14.2.1-1."

Westinghouse's Response: "Subsection 14.2.1, has been revised to include the test objectives identified in the August 8, 1994 response to RAI 260.23. In addition, test abstracts for applicable systems identified in Regulatory Guide 1.68, Revision 2, Appendix A have been included."

Staff's Response: In its July 8, 1994, response to RAI 260.23 (not August 8, as indicated by Westinghouse, above) Westinghouse confirmed that there are no tests which 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. Westinghouse agreed to revise the third, fourth, and fifth paragraphs in Subsection 14.2.1 of the SSAR, as indicated by the staff, above. However, the following items remain unresolved:

a. In Revision 9 to the SSAR, the AP600 design-specific PRA has not been included in (currently) subparagraph 14.2.1(e).

b. Westinghouse has not addressed whether Section 14.2.1, Paragraph (g) needs to be revised to reflect Westinghouse's response to this Open Item that "applicable systems" identified in RG 1.68 have been included (as stated above) or justify why only nonsafety-related SSCs in the RG are "applicable to AP600" as indicated in the current SSAR. If the intent of paragraph (g) is to include any remaining SSCs included in RG 1.68, App A, not identified in the paragraphs (a) through (f), this item should be clarified accordingly.

c. The SSAR will be reviewed to determine if the current (Rev. 9) ITP conclusively covers all AP600 plant-specific design features, systems (including those listed in Table 1.5-1 of the SSAR), and/or system configurations or interactions which meet either of the following criteria: (1) are significantly different from those found in light water reactor designs described in 10 CFR 52.47(b)(1), or (2) utilize simplified, inherent, passive, or other innovative means to accomplish their intended safety functions.

Therefore, these portions of **DSER Open Item 14.2.1-1** remain open.

OITS 1236/DSER Open Item 14.2.2-2: "The staff also finds that Section 14.2.2 of the SSAR should be revised 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 should also include, as appropriate, delineation of the following testing information: (a) specific plant operational conditions under which the tests will be conducted, (b) testing methodologies to be used, (c) specific data to be collected, (d) acceptable data reduction techniques, and (e) 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 Section 14.2.9, as appropriate) should include the following COL action items to be provided by the prospective COL applicant for staff review: (a) the scoping document (i.e., preoperational and startup test

specifications) containing testing objectives and acceptance criteria applicable to Westinghouse's scope of design responsibility. This is COL Action Item 14.2.2-1; (b) the scoping document, and any related 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. This is COL Action Item 14.2.2-2; (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. This is COL Action Item 14.2.2-3; and (d) the approved preoperational test procedures (to be provided approximately 60 days before their intended use, and startup test procedures (to be provided approximately 60 days before fuel loading). This is COL Action Item 14.2.2-4.

These issues were previously identified by the staff in Q260.24. This is Open Item 14.2.2-2."

Westinghouse's Response: "Information to be provided by the COL, related to the plant initial test program, has been added to the SSAR in Section 14.4."

Staff's Response: Although not specifically acknowledged in this response, Westinghouse's previous response to Q260.24 was provided in their July 22, 1994, letter to the NRC. In this letter, Westinghouse had stated, in part, that "It is inappropriate for the SSAR to specify the specific form the designers and/or equipment suppliers must supply the information. The optimum form may evolve with information technology and lessons learned from initial plants."

SSAR Section 14.4, "Combined License Applicant Responsibilities," subsections 14.4.2, "Test Specifications and Procedures" and 14.4.3, "Conduct of Test Program" both assert that the COL applicant is responsible for (1) providing test procedures for the preoperational and startup tests for NRC review, and (2) formulating the startup administration manual (procedure) which contains the administration procedures and requirements that govern the activities associated with the plant initial test program, as identified subsection 14.2.3, "Test Procedures."

However, subsection 14.2.3 <u>does not address</u> the responsibility of the COL applicant in preparing the following: (a) the scoping document (i.e., preoperational and startup test specifications) containing testing objectives and acceptance criteria <u>applicable to Westinghouse's scope of design responsibility</u>, and (b) 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. The purpose of Q260.24 and Q260.28 <u>was not</u> to dictate or specify the "specific form the designers and/or equipment suppliers must supply the information." Rather, the issue at hand is the <u>need to explicitly identify and define</u> specific documented information (i.e., "scoping documents" as defined above) that the prospective COL applicant must provide for staff review. Therefore, these portions of **DSER Open Item 14.2.2-2** remain open.

OITS 1238/DSER Open Item 14.2.2.2-1: "This section (and/or Section 14.2.9, as appropriate) should include the following COL action items to be provided by

the prospective COL applicant for staff review: the scoping document (i.e., preoperational and startup test specifications) containing testing objectives and acceptance criteria applicable to Westinghouse's scope of design responsibility. This is COL Action Item 14.2.2-1"

Westinghouse's Response: COL Action Items related to the plant initial testing program have been added to the SSAR in Section 14.4.

Staff's Response: See **OITS 1236/DSER Open Item 14.2.2-2, above.**

OITS 1245/DSER Open Item 14.2.8-7: "In startup test abstract 14.2.8.2.34, Westinghouse takes exception to RG 1.68 for testing natural circulation as has been done for current pressurized water reactor (PWR) plants. The justification for this exception is that the performance of a natural circulation test is not necessary to demonstrate flow characteristics of the plant. The physical layout of the plant and key components (steam generators, pumps, piping, and reactor vessel) is identical for each unit. Typical manufacturing and construction variations in these parameters will have no significant impact on the natural circulation flow. Since the design and layout is fixed between each AP600 plant, no changes in the natural circulation characteristics will occur. Other system flow and performance measurements taken during the hot functional and power ascension testing will provide assurances that the overall flow characteristics of the plant are equivalent to the reference plant. Therefore, demonstration of the natural circulation characteristics on the first AP600 plant will be sufficient to validate the design characteristics. The natural circulation test is prototypical.

The staff finds this response will be acceptable for startup test abstract 14.2.8.2.34, provided that the following criteria are met: (1) Appropriate justification for this exception to RG 1.68, Appendix A, Item 4.t, is included in Appendix 1A of the SSAR, or Section 1.9.3 of the SSAR, as appropriate. (This justification should provide appropriate reference to Westinghouse's response for NUREG-0737, action item I.G.1, as described in the attachments to the letter from Westinghouse (E.P. Rahe) to the NRC (H.R. Denton), dated July 8, 1981); and (2) Westinghouse identifies this issue, in Section 14.2.9 of the SSAR (or its subsequent equivalent), as a COL action item, which will require COL applicants referencing the AP600 design to perform the following: (a) demonstrate that the physical layout and configuration of the proposed plant and key components (steam generators, pumps, piping, and reactor vessel) remain identical to the reference plant; (b) validate the acceptance criteria, provided by Westinghouse, for the specific values or ranges of values for other system flow and performance measurements that are to be taken during the hot functional and power ascension testing to confirm that the overall flow characteristics of the proposed plant are equivalent to the reference plant. This is COL Action Item 14.2.8-1 and Open Item 14.2.8-7."

Westinghouse's Response: Section 14.3 provides reference to Certified Design Material which commits the COL to conduct the Initial Test Program. As part of that Initial Test Program, the COL will verify the physical layout and configuration of the components, and component parameters important to the

natural circulation of fluid in the reactor coolant system. These verifications will establish that AP600 plants subsequent to the first plant, will achieve natural circulation flow similar to the flow demonstrated by testing in the first plant.

Staff's Response: While the Certified Design Material (CDM) provides that the COL conduct certain testing to satisfy ITAAC requirements, the CDM does not commit the COL to conduct the Initial Test Program. § 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.**

In order to address the staff's concerns on this issue, Westinghouse needs to (1) confirm that the ITAAC process will (a) demonstrate that the physical layout and configuration of the proposed plant and key components (steam generators, pumps, piping, and reactor vessel) remain identical to the reference plant; (b) validate the acceptance criteria, provided by Westinghouse, for the specific values or ranges of values for other system flow and performance measurements that are to be taken during the hot functional and power ascension testing to confirm that the overall flow characteristics of the proposed plant are equivalent to the reference plant; and (2) include appropriate justification for this exception to RG 1.68, Appendix A, Item 4.t, in Appendix 1A of the SSAR, or Section 1.9.3 of the SSAR, accordingly. (This justification should provide appropriate reference to Westinghouse's response for NUREG-0737, action item I.G.1, as described in the attachments to the letter from Westinghouse (E.P. Rahe) to the NRC (H.R. Denton), dated July 8, 1981); otherwise, Westinghouse should commit to performing the requisite natural circulation testing in accordance with RG 1.68, Appendix A, Item 4.t. **DSER Open Item 14.2.8-7** remains open.

OITS 1247/DSER Open Item 14.2.8-9: Westinghouse should modify startup test abstract 14.2.8.2.41 in Appendix 1A of the SSAR to include applicability of this testing to subsequent AP600 plants, or to provide appropriate justification for this exception to RG 1.68, Appendix A, Item 5.j.j. This is Open Item 14.2.8-9.

Westinghouse's Response: [EELB] Chapter 14 has been revised to delete testing which simulates a loss of off-site electrical power with the reactor core at power, however, each aspect of a loss of off-site power transient is tested separately. These tests include the RCP flow coastdown test (14.2.10.1.18), the diesel generator start, and load testing (14.2.9.2.17), the rod control system test (14.2.10.1.11), and the rod drop time measurement test (14.2.10.1.14).

Staff's Response: The staff finds that Westinghouse's justification for deleting testing to demonstrate that the dynamic response of the plant is in accordance with design for the condition described in RG 1.68, Appendix A, Item 5.j.j is unacceptable. While results obtained when performing discrete systems tests at separate intervals may be indicative of the overall expected plant behavior during postulated operational transients, such testing is not a substitute for demonstrating that the actual dynamic plant response, including anticipated systems interactions, is in accordance with design during a

simulated or actual transient. Westinghouse should revise Chapter 14 to reinstate testing for the condition described in RG 1.68, Appendix A, Item 5.j.j. **DSER Open Item 14.2.8-9** remains open.

OITS 1249/DSER Open Item 14.2.8-11: Startup test abstract 14.2.8.2.51 should be modified in Appendix 1A of the SSAR to include applicability of this testing to subsequent AP600 plants, or to provide appropriate justification for this exception to RG 1.68, Appendix A, Item 5.n.n.

Westinghouse's Response: Subsection 14.2.10.4.21 specifies that the 100 percent load rejection test is to be performed only on the first AP600 plant. This testing provides measurements of the plant parameters including reactor power and primary and secondary pressures and temperatures that occur following this transient. Subsequent plants have similar equipment, control systems, and setpoints. The above first-plant-only test meets the following criteria used to establish which testing is to be performed only on the first AP600 plant: (a) the performance parameter(s) to be measured is not provided by previous certification, qualification, or prototype testing; and (2) construction and installation inspections and other preoperational tests, performed on every plant, demonstrate that the performance parameter(s) does not change from plant to plant.

Staff's Response: The staff finds that Westinghouse's justification for not demonstrating that the dynamic response of the plant is in accordance with design for the condition described in RG 1.68, Appendix A, Item 5.n.n., on all subsequent plants is unacceptable.

RG 1.68, Appendix A, Item 5.n.n., provides for the demonstration that the dynamic response of the plant is in accordance with design for the case of a full load rejection transient with the plant's electrical distribution system aligned for normal full power operation, and in such a manner that the turbine-generator is subjected to the maximum credible overspeed condition. While we may agree that subsequent AP600 plants have similar equipment, control systems, and associated setpoints, this test is not conducted just to demonstrate that the performance parameters do not change from plant to plant. Rather, the purpose of this test is to demonstrate that the integrated dynamic response of the as-built plant, including all associated systems and/or design features, conforms to the postulated plant response when subjected to this anticipated transient. Therefore, subsection 14.2.10.4.21 needs to be modified to include applicability of this testing to subsequent AP600 plants. **DSER Open Item 14.2.8-11** remains open.

OITS 1252/DSER Open Item 14.2.8-14: Westinghouse should revise Section 14.2.8 of the SSAR to reconcile its contents with that of Section 14.2.2 of the SSAR, as discussed above in relation to Q260.24.

Westinghouse's Response: Responses to RAIs 260.24 and 260.28 have been provided [July 22, 1994 letter to NRC]. Section 14.4 has been revised to specify the COL provide appropriate initial test program documents for review by the staff.

Staff's Response: See **OITS 1236/DSER Open Item 14.2.2-2**, above.

OITS 1253/DSER Open Item 14.2.8-15: Westinghouse should revise Section 14.2.8 of the SSAR, as well as the individual test methods or performance criteria, to provide specific references to the basis for determining acceptable system and component performance.

Westinghouse's Response: Subsection 14.2.9 has been revised to specify specific references that should be used to determine acceptable system and component performance.

Staff's Response: Based on our initial review of the Revision 9 submittal, Westinghouse has not satisfactorily provided specific references to the basis for determining acceptable system and component performance. In general, the revised test abstracts provide less detail than did their predecessors. A detailed review of the SSAR will be conducted to determine whether the test abstracts accurately reflect appropriate test conditions. **DSER Open Item 14.2.8-15** remains open.

OITS 1254/DSER Open Item 14.2.8-16: See **OITS 1255/DSER Open Item 14.2.8.3-1**, below.

OITS 1255/DSER Open Item 14.2.8.3-1: The staff finds that the preoperational and startup test phase descriptions in Section 14.2.8 of the SSAR do not provide assurance that the operability of several of the systems and components listed in Appendix A of RG 1.68 (Revision 2, August 1978) will be demonstrated. The test abstracts of Section 14.2.8 of the SSAR should be expanded to address the following items identified in Appendix A to RG 1.68, or Appendix 1A of the SSAR should be revised to provide technical justification for any exceptions taken.

- Preoperational Testing

1.a.(2)(i)	pressurizer safety valves
1.b.(1)	control rod withdrawal inhibit and rod runback functions
1.c	diverse actuation system, which protects the facility from anticipated transients without a scram (ATWS)
1.e.(4)	steam generator pressure safety valves
1.e.(10)	feedwater heaters and drains
1.f.(2)	cooling towers and associated auxiliaries
1.j.(7)	leak detection systems used to detect failures in the emergency core cooling system (ECCS) and containment recirculation systems located outside containment (for example, potential leakage in the normal residual heat removal (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 T-average 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.l.(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
1.n.(9)	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 (including proper operation of smoke and toxic chemical detection systems and ventilation shutdown devices, including leak tightness 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

1.o.(3) safety devices for reactor components handling systems equipment

- Initial Fuel Loading and Precritical Tests

2.f reactor core and other major components differential pressure and vibration testing after fuel loading

- Low Power Testing

4.i control rod block and inhibit functions

- Power Ascension Tests

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 gaseous and liquid radioactive waste processing, storage, and release systems (operating 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

These issued were previously identified by the staff in Q260.30. This is Open Item 14.2.8.3-1.

Westinghouse's Response: Subsection 14.2.9 has been revised to include test abstracts for appropriate AP600 systems and components as specified in RG 1.68, Revision 2, Appendix A.

Staff's Response: Based on our initial review of the Revision 9 submittal, Westinghouse has not satisfactorily revised test abstracts to demonstrate the requested items. A detailed review of the SSAR will be conducted to determine whether the test abstracts accurately reflect suitable test methods under the appropriate plant conditions. **DSER Open Item 14.2.8.3-1 remains open.** The following items are initial comments derived from a limited review of these items. [SPLB]

- Appendix A to RG 1.68, Section (d) identifies steam line atmospheric dump valves and relief valves to be included in the preoperational testing. In Attachment 3 to the letter of July 16, 1996, Westinghouse listed these valves to be included in SSAR Chapter 14 Sections 14.2.9.2.1 and 14.2.9.1.2 respectively. However, the staff could not find the testing of these valves in above two SSAR sections. Westinghouse is requested to add these valves according to Attachment 3.

- Appendix A to RG 1.68, Section (e) identifies steam generator pressure relief valves, turbine control and intercept valves, and main condenser hotwell level control system to be included in the preoperational testing. In Attachment 3 to the letter of July 16, 1996, Westinghouse listed these items to be included in SSAR Chapter 14 Sections 14.2.9.1.2, 14.2.9.2.1, or 14.2.9.4.1. However, the staff could not find the testing of SG pressure relief valves, turbine control and intercept valves in the above SSAR sections. Westinghouse is requested to add these items according to Attachment 3.

- Appendix A to RG 1.68, Section (f) identifies cooling towers and associated auxiliaries, and raw water and service water cooling towers to be included in the preoperational testing. In Attachment 3 to the letter of July 16, 1996, Westinghouse listed these items to be included in SSAR Chapter 14 Section 14.2.9.4.6. However, the staff could not find the testing of cooling towers and associated auxiliaries, and raw water and service water cooling towers in the above SSAR section. Westinghouse is requested to add these items according to Attachment 3.

OITS 1256/DSER Open Item 14.2.8.4-1: The staff finds that the preoperational and startup test phase descriptions in Section 14.2.8 of the SSAR do not provide assurance that the operability of several of the systems and components listed in the following RGs will be demonstrated. The test abstracts of Section 14.2.8 of the SSAR should be expanded to address the following items, or Appendix 1A of the SSAR should be revised to provide technical justification for any exceptions taken.

- RG 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 (RP) of RG 1.68.2:

  - Hot Standby Demonstration (RP C.3), including the following:

  - With initial conditions of the reactor at a moderate power level (10 to 25 percent), demonstrate that plant systems are in the normal configuration with the turbine generator in operation and with the minimum shift crew

  - Using only credited remote shutdown equipment, demonstrate the capability to achieve hot standby status, and maintain stable hot standby conditions for at least 30 minutes.

  - Cold Shutdown Demonstration (RP C.4), including the following:

- with the plant at hot standby conditions;

- with the procedurally designated crew positions;

- using only credited remote shutdown equipment, demonstrate the capability to perform a partial cooldown by performing the following actions:

- lower reactor coolant pressure and temperature sufficiently to permit operation of the residual heat removal (RHR) system

- initiate and control operation of the RHR system

- establish a heat transfer path to the ultimate heat sink

- reduce reactor coolant temperature approximately 50 F using the RHR system

- RG 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 pressure-reducing stations (RP C.2)

  - Flow, temperature, and pressure meet design specifications (RP C.4)

  - Total air demand with leakage meets design (RP C.5)

  - Single failure criterion (RP C.7)

  - Sudden and gradual loss of system pressure and appropriate response of air power equipment (RP C.8)

  - Functional test for increase in the air supply system pressure does not cause loss of operability (RP C.11)

- RG 1.140 - 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 RP of RG 1.140.

  - heaters (RP C.3.a)
  - prefilters (RP C.3.m)
  - HEPA filters DOP tests (RPs C.3.b and C.5.c)
  - ductwork (RP C.3.f)
  - fans and motors mounting and ductwork (RP C.3.i)
  - dampers (RP C.3.l)
  - adsorber sections/cells and activated charcoal (RPs C.3.h and C.5.d)

These issues were previously identified by the staff in Q260.31. This is Open Item 14.2.8.4-1.

Westinghouse's Response: Subsection 14.2.9.1.12 has been revised to include testing to verify the ability to initiate actuation signals to the systems/components required for reactor shutdown from the remote shutdown workstation. Note that the AP600 remote shutdown workstation provides the operator with the same capability to maintain the plant at hot shutdown conditions, or to cool the plant down; as is provided from the main control room. Therefore, the operator does not need to perform manual actions or operate equipment from local control panels. In addition, test abstracts for the instrument and compressed air system and appropriate HVAC systems have been revised.

Staff's Response: Based on our initial review of the Revision 9 submittal, Westinghouse has not satisfactorily revised test abstracts to demonstrate the requested items. In general, the revised test abstracts provide less detail than did their predecessors. A detailed review of the SSAR will be conducted to determine whether the test abstracts accurately reflect appropriate test conditions. **DSER Open Item 14.2.8.4-1** remains open.

OITS 1257/DSER Open Item 14.2.9-1: The staff recommended that Section 14.2.9 of the SSAR be retitled as "COL License Information - Initial Test Program." This title would more accurately reflect the purpose of this section within the SSAR (i.e., to identify the information to be supplied to the NRC by COL applicants referencing the AP600 design). In addition, the content of Section 14.2.9 of the SSAR 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":

- electrical switchyard equipment
- site security plan equipment
- personnel monitors and radiation survey instruments
- automatic dispatcher control system (if applicable)

This item corresponds to Q260.32. This is Open Item 14.2.9-1.

Westinghouse's Response: Section 14.3 provides reference to COL information items to verify site specific aspects of the plant that may require testing are within the certification envelope.

Staff's Response: In its July 22, 1994 letter to the NRC, and in response to Q260.32, Westinghouse had agreed to the staff's proposed revisions and recommendations. However, Revision 9 to the SSAR has relocated such information to Section 14.3, "Certified Design Material." In its August 13, 1994, response to this open item, Westinghouse states that Section 14.3 "provides reference to COL information items to verify site specific aspects of the plant that may require testing are within the [design] certification envelope."

Based on the above, the staff requests that Westinghouse identify which subsection of Section 14.3, "Certified Design Material," designates "site-specific aspects of the plant" that may require testing by the COL applicant to satisfy certain AP600 interface requirements, such as those identified in Q260.32. **DSER Open Item 14.2.9-1** remains open.

OITS 1258/DSER Open Item 14.2.9-2: The staff finds that the startup administrative manual, described in Section 14.2.2.1 of the SSAR, should be identified in this section [14.2.2.1 Conduct of Test Program], and in others as appropriate, as "COL License Information" (i.e., information to be supplied to the NRC by COL applicants referencing the AP600 design). In addition, Westinghouse should include a description of the organizational units and any augmented organizations or other personnel that will manage, supervise, or execute any phase of the ITP in a manner consistent with the guidance in Section 14.2.2 of RG 1.70. Portions of the issues outlined above were previously identified by the staff in Q260.25.

Westinghouse's Response: Section 14.4 has been revised to include a COL information item to provide a startup administrative manual that will delineate specific permissions required for the approval of test results and the permission to proceed to the next testing phase.

Staff's Response: Section 14.4.3, "Conduct of Test Program," states that the COL applicant is responsible for [developing] a startup manual as identified in Subsection 14.2.3, "Test Procedures". It appears that Westinghouse has addressed the specific issues identified in Q260.25. **DSER Open Item 14.2.9-2** is closed pending detail review.

OITS 1828/DSER Confirmatory Item 14.2.7-1: Westinghouse will revise the SSAR to state that the startup administrative manual (procedures) will be the responsibility of the COL applicant, as will other documents that delineate the test program schedule for the initial test program.

Westinghouse's Response: Section 14.4, has been revised to include a COL information item to provide a startup administrative manual that will delineate the test program schedule for staff review.

Staff's Response: See **OITS 1258/DSER Open Item 14.2.9-2**, above.

OITS 1963/DSER COL Open Item 14.2.2-1: The COL applicant should provide for staff review, the scoping document (i.e., preoperational and startup test specifications) containing testing objectives and acceptance criteria applicable to Westinghouse's scope of design responsibility.

Westinghouse's Response: Section 14.4, has been revised to include a COL item to provide preoperational and startup test procedures containing test objectives and acceptance criteria for Westinghouse scope systems/components.

Staff's Response: See **OITS 1236/DSER Open Item 14.2.2-2**, above.

OITS 1964/DSER COL Open Item 14.2.2-2: The COL applicant should provide for staff review, the scoping document, and any related 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.

Westinghouse's Response: Section 14.4, has been revised to include a COL item to provide preoperational and startup test procedures to delineate test conditions, testing method, data to be collected, and data reduction techniques.

Staff's Response: Section 14.4.3, "Conduct of Test Program," states that the COL applicant is responsible for [developing] a startup manual as identified in subsection 14.2.3, "Test Procedures". It appears that Westinghouse has addressed the specific issues identified in this open item. **DSER COL Open Item 14.2.2-2** is closed pending detail review.

OITS 1965/DSER COL Open Item 14.2.2-3: The COL applicant should provide for staff review, 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.

Westinghouse's Response: Section 14.4, has been revised to include a COL item to provide preoperational and startup test procedures to delineate any reconciliation methods needed to account for test conditions, methods, or results if testing is performed at conditions not representative of design conditions.

Staff's Response: Please identify which subsection of Section 4.4, "Combined License Applicant Responsibilities," includes the COL applicant item identified in **DSER Open Item 14.2.2-3** (See **OITS 1236/DSER Open Item 14.2.2-2**, above).

OITS 1966/DSER COL Open Item 14.2.2-4: The COL applicant should provide for staff review, the approved preoperational test procedures (to be provided approximately 60 days before their intended use), and startup test procedures (to be provided approximately 60 days before fuel loading).

Westinghouse's Response: Section 14.4, has been revised to include a COL item to provide preoperational and startup test procedures for all safety-related systems, and systems that perform defense-in-depth functions approximately 60 days before their intended use; and to provide approved startup test procedures 60 days before fuel loading.

Staff's Response: [SPLB, HQMB] While Section 14.2.3, "Test Procedures," as referenced in Section 14.4, appears to address the COL item identified above, Subsection 14.2.3 appears to also draw an unacceptable distinction between the availability (for NRC review) of preoperational test procedures for systems/components that perform safety-related functions, or of those that are nonsafety-related but perform defense-in-depth functions (in the context of the AP600 design) versus those that do not perform either type of functions but which still satisfy RG 1.68, Regulatory Position (RP) C.1, "Criteria for Selection of Plant Features To Be Tested." RG 1.68 does not provide for this distinction and, therefore, all plant system and/or features identified in

accordance with subsection 14.2.1, "Summary of Test Program and Objectives," (once found acceptable) are subject to NRC review and approval. This exception to RG 1.68 is unacceptable and should be deleted.

Additionally, it is inappropriate for this subsection to specify that only safety-related initial test program testing will be conducted in accordance with the quality assurance requirements of SSAR Section 17.4. While RG 1.68 and Criterion XI, "Test Control," of Appendix B to 10 CFR Part 50 both recognize that not all SSCs have to be tested to the same stringent requirements, they both also hold that the test program must be conducted in a manner that establishes that SSCs will perform satisfactorily in service. Westinghouse's statement in this subsection implies that all testing of SSCs that do not perform safety-related functions will be performed in accordance with quality assurance requirements not currently described in SSAR Section 17.4. Westinghouse should delete this statement or, otherwise, supplement SSAR Section 17.4 to include a detail description of the quality assurance program requirements that will govern testing of SSCs that do not perform safety-related functions. **DSER Open Item 14.2.2-4** remains open.

OITS 1967/DSER COL Open Item 14.2.2.2-1: The COL applicant should provide the startup administrative manual, which will delineate the review, evaluation, and approval of test results, for staff review.

Westinghouse's Response: Section 14.4, has been revised to include a COL item to provide the startup administration manual which delineates the review, evaluation, and approval of test results.

Staff's Response: Please identify which subsection of Section 4.4, "Combined License Applicant Responsibilities," includes the COL applicant item identified in **DSER Open Item 14.2.2-1**.

OITS 1968/DSER COL Open Item 14.2.8-1: See **OITS 1245/DSER Open Item 14.2.8-7**, above.

Westinghouse's Response: Section 14.3 references Certified Design Material which commits the COL to conduct an Initial Test Program. As part of that Initial Test program, the COL will verify that reactor coolant system parameters are comparable to the first AP600 plant in order to obtain similar natural circulation flows.

Staff's Response: See **OITS 1245/DSER Open Item 14.2.8-7**, above. **DSER COL Open Item 14.2.8-1** remains open.

OITS 2547/Q260.39: ITP Test Abstract 14.2.8.1.30, Feedwater Control System: The Test Method subsection should be revised to incorporate verification that automatically initiated valve open/closure cycling and timing meets the system design basis requirements.

Westinghouse's Response: The test abstract for the steam generator system in Subsection 14.2.9.1.2, specifies that the proper operation of the main and startup feedwater valves is verified, including automatic open/close valve

operation and timing. Additional testing of the main feedwater valves is specified with the reactor at power during the startup testing described in Subsection 14.2.10.1.22

Staff's Response: [SPLB] Subsection 14.2.9.1.2 does not specify that the proper operation of main and startup feedwater valves is verified as noted. **OITS 2547** remains open.

OITS 2568/Q260.60: In ITP Test Abstract 14.2.8.2.50, "50 Percent Load Rejection," the Performance Criterion subsection should specify the acceptable ranges of the primary and secondary parameters (pressure, level, temperature, etc.) or provide specific acceptance criteria or design basis functional requirements traceable to the appropriate SSAR sections.

Westinghouse's Response: The test abstract for the 50 percent load rejection test has been deleted. The AP600 is designed to accept a 100 percent load rejection which is included in the startup testing program in Subsection 14.2.10.4.21.

Staff's Response: Westinghouse has not provided adequate description of tests intended to address RG 1.68, Appendix A, Item 5.h.h. Westinghouse needs to (1) establish what constitutes the design load swing for the AP600 design, and (2) identify which test abstract(s) will demonstrate that the dynamic response of the plant to such design load swings for the facility is in accordance with design. **OITS 2568 remains open.**

OITS 2570/Q260.62: The staff-identified systems should be incorporated into the AP600 ITP. Westinghouse should identify and revise the pertinent test abstracts or summaries to encompass them, or create additional abstracts accordingly.

Westinghouse's Response: Chapter 14 has been revised to include test abstracts as specified in RG 1.68, Revision 2, Appendix A, which includes testing for the systems/components listed. Confirmation of the reactor vessel flood flow areas and insulation arrangement are inspections performed during/after construction.

Staff's Response: SPLB] In its August 13, 1996, response Westinghouse failed to address the following systems/design features:

- Annex/Auxiliary Building Non-Radioactive HVAC System, conforming to the functions of the system as described in SSAR Section 9.4.2, and RG 1.68, Appendix A, Items 1.n.14.a, 1.n.14.c, 1.n.14.e and 1.h.6.

- Radwaste Building Ventilation System, conforming to the functions of the system as described in SSAR Section 9.4.8, and RG 1.68, Appendix A, Items .n.14.a and 1.n.14.e.

- Turbine Building Ventilation System, conforming to the functions of the system as described in SSAR Section 9.4.9, and RG 1.68, Appendix A, Items .n.14.a and 1.n.14.e.

- Diesel generator Ventilation System, conforming to the functions of the system as described in SSAR Section 9.4.10, and RG 1.68, Appendix A, Items 1.n.14.a and 1.n.14.d.

- Health Physics and Hot Machine Shop HVAC System, conforming to the functions of the system as described in SSAR Section 9.4.10, and RG 1.68, Appendix A, Items 1.n.14.a and 1.n.14.e.

OITS 2641/Q260.67: Chapter 14 - Initial Test Program. 14.2.8.1.18, In-Plant Communication System: The Test Methods and Performance Criterion subsections of this abstract need to be revised to demonstrate acceptable performance of all subsystems encompassed by the In-Plant Communication System as described in SSAR Section 9.5.2.

Westinghouse's Response: The test abstract for the plant communication system in Subsection 14.2.9.4.13 has been revised to include verification of the proper performance of the system subsystems.

Staff's Response: [HICB] SSAR section 9.5.2 states that the In-plant Communication system includes the following subsystems:

* Wireless telephone system
* Telephone/page system
* Private automatic branch exchange (PABX) system
* Sound power phone system
* Emergency response facility communication system
* Security communication system

The communication system allows each guard, watchman or armed response individual on duty, to maintain continuous communication with an individual at each manned alarm station (access to vital areas) and with off-site agencies as required by 10 CFR 73, Section 55 (e) Detection Aids, and (f) Communication Requirements. Communication equipment used with respiratory protection devices will be designed and selected in accordance with EPRI guidance document NP-6659, "Voice Communication Systems Compatible with Respiratory Protection."

The "General Test Methods and Acceptance Criteria" should include a procedure to verify the above commitments. **OITS 2641** remains open.

OITS 2642/Q260.68: Chapter 14 - Initial Test Program. 14.2.8.1.51, Operations and Control Center System: This test abstract does not reflect the design and configuration of the AP600 Operations and Control Center System. Specifically, the primary plant control system operator interface is a set of "soft" control units that replace conventional switch/light or potentiometer/meter assemblies used for operator interface with control systems. The function-based test analysis serves as the basis for determining the alarms, displays, controls, and procedures in the main control area.

The Test Methods and Performance Criterion subsections of this abstract need to be revised to demonstrate acceptable performance of, and to encompass, these unique AP600 design features.

Westinghouse's Response: The test abstract for the plant control system in Subsection 14.2.9.2.12 has been revised to reflect the use of "soft" controls and function-based analysis for alarms, displays, controls, and procedures used in the AP600.

Staff's Response: [HICB] The general test methods and acceptance criteria should include the use of "soft" controls and function-based analysis for alarms, displays, controls, and procedures used in the AP600. **OITS 2642** remains open.

OITS 2646/Q260.72: Chapter 14 - Initial Test Program. 14.2.8.1.8i, Pressurizer Pressure and Level Control: The Test Method subsection does not include testing of signal selector and isolation devices. Westinghouse should revise this subsection to encompass testing of these devices or should identify the test abstract that encompasses such testing.

Westinghouse's Response: The test abstract for the reactor coolant system in Subsection 14.2.9.1.1 specifies that the proper operation of the pressurizer pressure and level control is verified. Additional testing is also performed during the startup testing. Detailed methods for performing this verification, including signal selector and isolation devices, are to be included in the actual test procedures developed by the COL applicant.

Staff's Response: [HICB] The RAI's concern on testing of signal selector and isolation devices was not addressed in Subsection 14.2.9.1.1 or any other startup testing sections. Either specify how the COL applicant can develop test procedures to cover those components, or modify the appropriate test abstracts to reflect these tests. **OITS 2646** remains open.

OITS 2648/Q260.74: Chapter 14 - Initial Test Program, 14.2.8.2.46, Plant Control System: The scope of this test should be expanded to encompass all other Plant Control System subsystems as identified in SSAR Chapter 7.1. Alternatively, Westinghouse should identify the test abstracts that currently encompass such subsystems.

Westinghouse's Response: The test abstract for the plant control system in Subsection 14.2.9.2.12 has been revised to include the control functions specified in SSAR Section 7.1

Staff's Response: [HICB] Section 14.2.9.2.12 has not addressed all the control functions specified in the SSAR. **OITS 2648** remains open.

OITS 2931/Q260.75: This issue has been superseded by NSD-NRC-96-4772, dated July 16, 1996. **This item is closed.**

OITS 2932/Q260.76: This issue has been superseded by NSD-NRC-96-4772, dated July 16, 1996. **This item is closed.**

2. Additional issues/comments:

(a) Specific information already requested via RAIs 260.35 through 260.82 will also be evaluated during subsequent a review. Therefore,

RAIs 260.35 through 260.82 remain open (initial comments provided above on these RAIs were derived from a limited review of these items).

(b) The ITP should be revised to reinstate listings of preoperational and startup test descriptions. These were previously identified as Table14.2-1 and Table 14.2-2, respectively.

(c) Attachment 3 to the letter of July 16, 1996, provides a comparison table of RG 1.68, App. A, to the Chapter 14 preoperational test abstracts. A similar comparison table for the startup test abstracts would be useful.