

December 11, 1996

Mr. Nicholas J. Liparulo, Manager  
Nuclear Safety and Regulatory Activities  
Nuclear and Advanced Technology Division  
Westinghouse Electric Corporation  
P.O. Box 355  
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SUBJECT: STAFF UPDATE TO CERTAIN DRAFT SAFETY EVALUATION REPORT (DSER) OPEN  
ITEMS (OIs) AND REQUESTS FOR ADDITIONAL INFORMATION REGARDING THE  
WESTINGHOUSE AP600 INITIAL TEST PROGRAM (ITP)

Dear Mr. Liparulo:

As a result of recent efforts by the Nuclear Regulatory Commission staff, the status of several DSER OIs has changed and additional information needed to complete the review has been identified. Enclosed are OIs related to the ITP, and the staff's evaluations of these OIs.

Please update the open item tracking system database to reflect this information. 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

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Docket No. 52-003  
AP600

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## Westinghouse AP600 SSAR Chapter 14, Initial Test Program

### Staff's Response to Westinghouse Letter to NRC dated December 6, 1996 on "Response To Staff Comments On AP600 Initial Test Program"

Background: In a letter dated August 13, 1996, Westinghouse provided responses to the outstanding requests for additional information (RAIs) and Draft Safety Evaluation Report (DSER) open items for the AP600 Standard Safety Analysis Report (SSAR) Chapter 14, Initial Test Program. These issues are being tracked by both Westinghouse and the staff in the AP600 Open Items Tracking System (OITS).

As a result of its review of the August 13, 1996 letter, the staff forwarded additional questions and comments to Westinghouse via a November 8, 1996, letter. Subsequently, Westinghouse issued Draft Revision 10 to the AP600 SSAR Chapter 14 and provided its responses to the staff's questions and comments in a December 6, 1996 letter. The staff's review of these documents and the resultant/current OITS status is described below.

- ❑ OITS 1234/DSER Open Item 14.2.1-1: In the DSER, the staff found 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 was requested to 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 met 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.

Enclosure

For any such systems or design features identified, Westinghouse was requested to provide appropriate justifications for their exclusion from the ITP, or that the applicable test abstract(s) be modified to encompass them accordingly. The staff also found that Section 14.2.1 (or alternatively Section 14.2.8) of the SSAR should be revised to identify, if applicable, any startup tests 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 these issues had been previously identified by the staff as Q260.23. This was identified as DSER Open Item 14.2.1-1.

In its July 8, 1994 response to RAI 260.23, Westinghouse confirmed that there were no tests in Chapter 14 which demonstrated 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 also agreed to revise the third, fourth, and fifth paragraphs in Subsection 14.2.1 of the SSAR, as indicated by the staff in the DSER.

In its August 13, 1996 response to the NRC, Westinghouse stated that "Subsection 14.2.1, has been revised to include the test objectives identified in the August [July] 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." The staff agreed that Westinghouse had been responsive to the issues identified in this open item, except for the following:

- a. In Revision 9 to the SSAR, the AP600 design-specific PRA had not been included in (currently) subparagraph 14.2.1(e).
- b. Westinghouse had 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 had been included (as stated above) or justify why only nonsafety-related SSCs in the RG were "applicable to AP600" as indicated in the current SSAR revision. If the intent of paragraph (g) was to include any remaining SSCs included in RG 1.68, Appendix A, not identified in the paragraphs (a) through (f), this item should have been clarified accordingly.
- c. During its ongoing review, the staff will 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 remained open.

In its December 6, 1996 response, Westinghouse stated the following:

"a. Westinghouse did not use the design specific PRA as a criteria for selection of systems, structures or components to be included in the ITP. However, applying this criteria does not capture any additional AP600 SSC not currently captured by the criteria currently provided in section 14.2.1. Therefore, Westinghouse does not believe it is necessary to add a reference to the design PRA as a criteria for test selection.

b. Item 14.2.1(g) will be revised as follows:

"Other systems identified in RG 1.68 Rev. 2 App. A that are in the AP600 and are not captured by criteria a) through f)."

c. Table 1.5-1 of the SSAR lists specific AP600 design tests that have been performed to assess the performance of components and systems in the AP600 and does not represent a comprehensive list of design features, per se, in the AP600 that are significantly different from currently operating light water reactors or utilize passive systems. However, Westinghouse believes that those design features embodied in the design tests listed in Table 1.5-1 that meet the criteria listed in item c of the staff's response are conclusively tested as part of the AP600 Initial Test Program described in Chapter 14 of the SSAR.

The staff agrees with Westinghouse's position in (a), and confirmed that draft revision 10 of Chapter 14 includes the language described in (b). With regards to item (c), any AP600 plant-specific design feature identified by the staff during its comprehensive review of Chapter 14 as not being conclusively covered in the ITP, will be identified and tracked separately. Therefore, OITS 1234/DSER Open Item 14.2.1-1 is confirmatory pending formal submittal of Revision 10 to SSAR Chapter 14 (Confirmatory).

- OITS 1236/DSER Open Item 14.2.2-2: In the DSER, the staff found 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).

The staff also found that 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 was identified as 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 was identified as 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 was identified as 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 was identified as COL Action Item 14.2.2-4 (These issues were previously identified by the staff in Q260.24). This was identified as Open Item 14.2.2-2.

In its August 13, 1996 response to the NRC, Westinghouse stated that "Information to be provided by the COL, related to the plant initial test program, has been added to the SSAR in Section 14.4." Although not specifically acknowledged in this response, Westinghouse's previous response to Q260.24 was provided in their 7/22/94 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."

In its November 8, 1996 response to Westinghouse, the staff stated that 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, the staff noted that subsection 14.2.3 does not address the responsibility of the COL applicant in providing the following: (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, 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. (These COL applicant areas of responsibility are stipulated under Subsection 14.2.3, "Test Procedures," Section 14.2, "Specific Information To Be Included in Final Safety Analysis Reports," of Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants," Revision 3).

The staff also clarified that the purpose of Q260.24 and Q260.28 was not to dictate or specify the "specific form the designers and/or equipment suppliers must supply the information." Rather, the issue at hand is the need to explicitly identify and define 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 remained open.

In its December 6, 1996 response, Westinghouse stated the following:

"Section 14.2.3 will be retitled - Test Specifications and Procedures. The contents of current 14.2.3 as currently written applies to either Test Specs or Test Procedures (or both). Test Procedures will be modified to read Test Specifications and / or Procedures where appropriate. A paragraph describing the contents of the test specifications will be provided which includes:

'Criteria for test results evaluation and reconciliation methods and analysis as required.'

Test specifications or test procedures for each test performed during the Initial Test Program include testing objectives and acceptance criteria for each test." (Proposed SSAR Revision: Pages 14.2-4 and 14.2-5).

The staff found that the proposed SSAR revisions, while providing needed clarification and aiding in the resolution of other issues, do not address the COL applicant issues identified in items (a) and (b), above. Therefore, DSER Open Item 14.2.2-2 remains open pending an SSAR revision (Action W).

- OITS 1238/DSER Open Item 14.2.2.2-1: In the DSER, The staff stated that 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 was identified as COL Action Item 14.2.2-1.

In its August 13, 1996 response to the NRC, Westinghouse stated that "COL Action Items related to the plant initial testing program have been added to the SSAR in Section 14.4."

The staff finds this item confirmatory pending resolution of DSER Open Item 14.2.2-2, above (Confirmatory).

- OITS 1245/DSER Open Item 14.2.8-7: In the DSER, the staff found that in startup test abstract 14.2.8.2.34, Westinghouse had taken exception to RG 1.68 for testing natural circulation as had been done for current pressurized water reactor (PWR) plants. The justification for this exception was that the performance of a natural circulation test was 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) remain identical for each unit. Typical manufacturing and construction variations in these parameters would 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 would occur. Other system flow and performance measurements taken during the hot functional and power ascension testing would 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 would be sufficient to validate the design characteristics. The natural circulation test is prototypical.

The staff found this response would be acceptable for startup test abstract 14.2.8.2.34, provided that the following criteria were 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 was identified as COL Action Item 14.2.8-1 and as Open Item 14.2.8-7.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse, the staff clarified that 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 would need 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 remained open.

In its December 6, 1996 response, Westinghouse stated the following:

"Section 3.4 of the AP600 CDM as submitted for staff review on November 8, 1996 contains a high level commitment to perform an Initial Test Program by the COL applicant."

Justification for this exception will be provided in Appendix 1A of the SSAR citing the appropriate reference and stating the rationale:

'For the AP600, natural circulation heat removal is not safety-related, as in current plants. This safety-related function is performed by the



PRHR. Natural circulation heat removal via the PRHR is tested for every plant. Therefore, Westinghouse has met the intent of the previous licensing commitments for natural circulation testing.'

This justification will be provided in Section 1.9.3 of the SSAR.

W response to NUREG-0737, action item I.G.1 provided a proposal for low power testing of existing and future W PWRs in Attachment 4 to the letter from Westinghouse (E. P. Rahe) to the NRC (H. R. Denton) dated July 8, 1981. For the AP600, W proposes the following similar exception; noting that the appropriate tests are contained in the AP600 ITP:

1. During hot functional testing, prior to fuel load, with the reactor coolant pumps not running and no onsite power available, the heat removal capability of the PRHR heat exchanger with natural circulation flow is verified (Section 14.2.9.3, item e).
2. After fuel loading, but prior to criticality, with the reactor system at no-load operating temperature and pressure and all RCPs operating, the depressurization rate is determined by de-energizing the heaters and pressure is further reduced through use of sprays (Section 14.2.10.1.19).
3. After criticality is achieved and the plant is at ~ 3% power, the plant is placed in a natural circulation mode by tripping all reactor coolant pumps and observing the plant response (Section 14.2.10.3.6).
4. A loss-of-offsite power test is performed with the plant at minimum power level supplying normal house loads. The turbine is tripped and the plant is placed in a stable condition using batteries and the diesel generator (Section 14.2.10.4.26).
5. Data obtained from the natural circulation tests is provided for operator training on a plant simulator at the earliest opportunity.

The staff finds Westinghouse's justifications on this issue responsive to the staff's concerns identified in DSER Open Item 14.2.8-7. However, a final determination on this issue will not be made until (1) the staff finds Section 3.4 of the AP600 CDM acceptable, and (2) the staff completes its comprehensive review of Chapter 14 (Action N).

- OITS 1247/DSER Open Item 14.2.8-9: In the DSER, the staff found that 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 provide appropriate justification for this exception to RG 1.68, Appendix A, Item 5.j.j. This was identified as Open Item 14.2.8-9.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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)."

In its November 8, 1996 response to Westinghouse, the staff found 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 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. The staff concluded that Westinghouse should revise Chapter 14 to reinstate testing for the condition described in RG 1.68, Appendix A, Item 5.j.j. Therefore, DSER Open Item 14.2.8-9 remained open.

In its December 6, 1996 response, Westinghouse stated that "This test will be included as section 14.2.10.4.26."

The staff finds the reinstatement of testing for the condition described in RG 1.68, Appendix A, Item 5.j.j. under section 14.2.10.4.26 of the SSAR acceptable. Therefore, OITS 1247/DSER Open Item 14.2.8-9 is confirmatory pending formal submittal of Revision 10 to SSAR Chapter 14 (Confirmatory).

- OITS 1249/DSER Open Item 14.2.8-11: In the DSER, the staff found that 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "Subsection 14.2.10.4.21 specifies that the 100% 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."

In its November 8, 1996 response to Westinghouse the staff stated 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 was unacceptable.

The staff added that 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 the staff 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 remained open.

In its December 6, 1996 response, Westinghouse stated that "This test will be performed on every plant."

The staff finds Westinghouse's response acceptable. Therefore, OITS 1249/DSER Open Item 14.2.8-11 is confirmatory pending formal submittal of Revision 10 to SSAR Chapter 14 (Confirmatory).

- OITS 1252/DSER Open Item 14.2.8-14: In the DSER, the staff found that 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse, the staff concluded that the closure of this issue was contingent upon the satisfactory

resolution of OITS 1236/DSER Open Item 14.2.2-2, above. In its December 6, 1996 response, Westinghouse concurred with the staff's conclusion. Therefore, OITS 1252/DSER Open Item 14.2.8-14 is confirmatory pending satisfactory resolution of OITS 1236/DSER Open Item 14.2.2-2 (Confirmatory).

- OITS 1253/DSER Open Item 14.2.8-15: In the DSER, the staff found that 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "Subsection 14.2.9 has been revised to specify specific references that should be used to determine acceptable system and component performance."

In its November 8, 1996 response to Westinghouse, the staff concluded that Westinghouse had 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. Therefore, DSER Open Item 14.2.8-15 remained open.

In its December 6, 1996 response, Westinghouse stated its belief that specific references have been provided in each preoperational test abstract. These references specify the SSAR section which define the functions performed by each system which are to be tested in the Initial Test Program.

The staff acknowledges Westinghouse's response, however, a final determination on OITS 1253/DSER Open Item 14.2.8-15 will not be made until the staff completes its comprehensive review of Chapter 14 (Action N).

- OITS 1254/DSER Open Item 14.2.8-16: Closure of this issue is contingent upon the satisfactory resolution of OITS 1255/DSER Open Item 14.2.8.3-1, below (Action N).
- OITS 1255/DSER Open Item 14.2.8.3-1: In the DSER, the staff found that the preoperational and startup test phase descriptions in Section 14.2.8 of the SSAR did not provide assurance that the operability of several of the systems and components listed in Appendix A of RG 1.68 (Rev. 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 issues were previously identified by the staff in Q260.30 and were subsequently identified in the DSER as Open Item 14.2.8.3-1.

In its August 13, 1996 response to the staff, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse, the staff found that Westinghouse had 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. Therefore, DSER Open Item 14.2.8.3-1 remained open.

Nonetheless, the following items were provided to Westinghouse as initial comments derived from a limited review of these items.

- 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 the 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.

- o 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.

In its December 6, 1996 response, Westinghouse stated the following:

"Section 14.2.9.1.2 Item a) commits to tests of safety-related valves in the SGS which includes the SG Power-Operated Relief (atmospheric dump) Valves. This section will be revised to delineate these valves specifically under item a).

Section 14.2.9.2.1 lists the other valves mentioned (with the appropriate AP600-specific name).

Test 14.2.9.4.6 does not specifically mention cooling towers for the following reasons:

- the circulating water system cooling tower is not within the scope of the AP600 design certification
- heat removal of an ultimate heat sink (such as a cooling tower) can not be tested during preops due to the absence of core power - commitments are made in 14.2.9.4.6 to test the ultimate heat sink (cooling tower or other) during hot functionals as appropriate

The service water cooling towers are tested as specified in 14.2.9.2.6."

The staff finds that Westinghouse has not addressed all issues identified under this open item, nonetheless, a final determination on the status of OITS 1255/DSER Open Item 14.2.8.3-1 will not be made until the staff completes its comprehensive review of Chapter 14 (Action N).

- o OITS 1256/DSER Open Item 14.2.8.4-1: In the DSER, the staff found that the preoperational and startup test phase descriptions in Section 14.2.8 of the SSAR did not provide assurance that the operability of several of

the systems and components listed in the following RGs would 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 was identified in the DSER as Open Item 14.2.8.4-1.

In its August 13, 1996 response to the NRC, Westinghouse stated the following:

"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.

In its November 8, 1996 response to Westinghouse, the staff concluded that Westinghouse had 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. Therefore, DSER Open Item 14.2.8.4-1 remained open.

In its December 6, 1996 response, Westinghouse stated the following:

"Westinghouse would appreciate specific comments from the staff on the appropriate test abstracts so that we can address the staff's concerns in these areas more readily.

For the instrument and control air systems, and the containment air filtration system, it should be noted that these are non-safety systems in the AP600 and therefore may not require as explicit details for testing these systems."

The staff agrees that specific comments on the appropriate items should be provided to Westinghouse. Therefore, a final determination on the status of OITS 1256/DSER Open Item 14.2.8.4-1 will not be made until the staff completes its comprehensive review of Chapter 14 (Action N).

- OITS 1257/DSER Open Item 14.2.9-1: In the DSER, 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 and was identified in the DSER as Open Item 14.2.9-1.

In its August 13, 1996 response to the NRC, Westinghouse stated 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 certification envelope."

In its November 8, 1996 response to Westinghouse the staff clarified that 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 stated 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 requested 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 remained open.

In its December 6, 1996 response, Westinghouse stated the following:

"Interface requirements as defined by 10 CFR Part 52.47 (a)(1)(vii) are discussed in section 14.3, fourth bullet. It is not necessary to provide a list of possible systems that may or may not require testing, as this determination will be made by the NRC at the time of the COL application."

As the staff's review of both Chapter 14 and the AP600 CDM is ongoing, a final decision on OITS 1257/DSER Open Item 14.2.9-1 will not be made until such reviews are completed (Action N).

- OITS 1258/DSER Open Item 14.2.9-2: In the DSER, the staff found 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse, the staff found that 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". The staff added that Westinghouse had apparently addressed the specific issues identified in Q260.25, and therefore, DSER Open Item 14.2.9-2 was considered closed pending completion of the Chapter 14 detail review (Confirmatory).

- OITS 1828/DSER Confirmatory Item 14.2.7-1: In the DSER, the staff found that the SSAR needed to be revised 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse, the staff concluded that closure of this issue is contingent upon the satisfactory resolution of OITS 1258/DSER Open Item 14.2.9-2, above (Confirmatory).

- OITS 1963/DSER COL Open Item 14.2.2-1: In the DSER, the staff found that 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse, the staff concluded that closure of this issue is contingent upon the satisfactory resolution of OITS 1236/DSER Open Item 14.2.2-2, above (Confirmatory).

- OITS 1964/DSER COL Open Item 14.2.2-2: In the DSER, the staff found that 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse the staff found that 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".

The staff added that Westinghouse had apparently addressed the specific issues identified in this open item, and therefore, DSER Open Item 14.2.2-2 was considered closed pending completion of the Chapter 14 detail review (Confirmatory).

- OITS 1965/DSER COL Open Item 14.2.2-3: In the DSER, the staff found that 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse the staff requested that Westinghouse 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 DSER Open Item 14.2.2-2, above).

In its December 6, 1996 response to the NRC, Westinghouse indicated that their response to OITS 1236/DSER Open Item 14.2.2-2 (above) also addressed this open item.

The staff concurs that closure of this issue is contingent upon the satisfactory resolution of OITS 1236/DSER Open Item 14.2.2-2, above (Confirmatory). ✓

- OITS 1966/DSER COL Open Item 14.2.2-4: In the DSER, the staff found that 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).

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse the staff concluded that while Section 14.2.3, "Test Procedures," as referenced in Section 14.4, appeared to address the COL item identified above, subsection 14.2.3 appeared 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 remained open.

In its December 6, 1996 response to the NRC, Westinghouse stated the following:

"R.G. 1.68 provides for a 'graded approach' and that 'While it is required that all SSCs important to safety be tested, it is not required that all of them be tested to the same stringent requirements.' Westinghouse has provided a comprehensive and systematic process to identify SSC



necessary to be included in the ITP to 'provide reasonable assurance that the facility (AP600) can be operated without undue risk to the public.' Based on a review of the AP600 SSCs, the SSCs requiring the highest level test commitments are the safety-related and defense-in-depth systems. The other systems included in the ITP have been provided for completeness, and need not and do not require the same level of test commitment with regards to the ITP.

To clarify the distinction between the most important and least important systems, Section 14.2.3 will be revised to state that: 1) Test specifications and test procedures for SSCs which perform in safety related or defense in depth functions will be available for NRC review prior to performance of the test, and 2) All testing will be performed in accordance with the quality assurance requirements as specified in Section 17.4.

Additionally, Section 17.4 will be revised to include testing within the Quality Assurance program developed by the combined license applicant. (Proposed SSAR Revision: Pages 14.2-5 and 17.1-2)."

The staff finds Westinghouse's justifications on this issue partially responsive to the staff's concerns identified in DSER COL Open Item 14.2.2-4. However, a final determination on this issue will not be made until (1) the staff finds the revised Section 17.4 of the AP600 SSAR acceptable, and (2) the staff completes its comprehensive review of Chapter 14 (Confirmatory).

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

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse the staff requested that Westinghouse identify which subsection of Section 14.4, "Combined License Applicant Responsibilities," includes the COL applicant item identified in DSER Open Item 14.2.2-1.

In its December 6, 1996 response to the NRC, Westinghouse stated that "Section 14.4.3 Conduct of Test Program" includes the COL applicant item identified in DSER Open Item 14.2.2-1. Therefore, closure of OITS 1967/DSER COL Open Item 14.2.2.2-1 is contingent upon the staff's acceptability of the contents of Section 14.4.3, "Conduct of Test Program" (Action N).

- OITS 1968/DSER COL Open Item 14.2.8-1: Issues identified under this open item correlate with those identified in OITS 1245/DSER Open Item 14.2.8-7, above.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse the staff concluded that closure of this COL open item was contingent upon the satisfactory resolution of OITS 1245/DSER Open Item 14.2.8-7, above, and therefore, DSER COL Open Item 14.2.8-1 remained open.

In its December 6, 1996 response to the NRC, Westinghouse referred to its response to OITS 1245/DSER Open Item 14.2.8-7, above, as providing the bases for closure of this open item. The staff agrees and, therefore, closure of OITS 1968/DSER COL Open Item 14.2.8-1 is contingent upon resolution of OITS 1245/DSER Open Item 14.2.8-7, above (Confirmatory).

- 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse the staff concluded that Subsection 14.2.9.1.2 does not specify that the proper operation of main and startup feedwater valves is verified as noted. Therefore, OITS 2547/Q260.39 remained open.

In its December 6, 1996 response to the NRC, Westinghouse stated the following:

"Section 14.2.9.1.2 bullet (a) verifies proper operation of safety-related valve functions and includes the main feedwater SG isolation valves.

Section 14.2.9.2.2 bullet(a) tests the defense-in-depth valve functions associated with the FWS to verify their proper operation. This section is revised to include verification of the proper functioning of the main feedwater pump and control valves."

The staff finds Westinghouse's justifications on this issue responsive to the staff's concerns identified in OITS 2547/Q260.39. However, a final determination on this issue will not be made until (1) the staff finds the relevant Chapter 14 sections technically acceptable, and (2) the staff completes its comprehensive review of Chapter 14 (Confirmatory).

- 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "The test abstract for the 50% load rejection test has been deleted. The AP600 is designed to accept a 100% load rejection which is included in the startup testing program in subsection 14.2.10.4.21."

In its November 8, 1996 response to Westinghouse, the staff found that Westinghouse had not provided an adequate description of tests intended to address RG 1.68, Appendix A, Item 5.h.h. The staff requested that Westinghouse (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. Therefore, OITS 2568 remained open.

In its December 6, 1996 response to the NRC, Westinghouse stated the following:

"Startup tests for 10% step load changes at 30%, 75% and 100% are specified in 14.2.10.4.20. The design basis 100% load rejection is specified in 14.2.10.4.21. Ramp changes are tested as part of load follow testing 14.2.10.4.22. These tests are sufficient to test the design basis load swings discussed in Chapters 5 and 7 of the AP600 SSAR."

The staff finds Westinghouse's justifications on this issue responsive to the staff's concerns identified in OITS 2568/Q260.60. However, a final determination on this issue will not be made until (1) the staff finds the relevant Chapter 14 sections technically acceptable, and (2) the staff completes its comprehensive review of Chapter 14 (Confirmatory).

- 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse, the staff found that Westinghouse had 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 1.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 1.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.

In its December 6, 1996 response to the NRC, Westinghouse stated the following:

"The following test abstracts will be added to Chapter 14 and are attached for your review:

- The Annex/Auxiliary Building non-radioactive HVAC System
- Turbine Building Ventilation System
- Health Physics and Hot Machine Shop HVAC System
- Radwaste Building Ventilation System

Testing of the Diesel Generator Ventilation System is specified as part of the testing for the diesel generators in the current Chapter 14.2.9.2.17."

The staff finds Westinghouse's justifications on this issue responsive to the staff's concerns identified in OITS 2570/Q260.62. However, a final determination on this issue will not be made until (1) the staff finds the proposed revision to relevant Chapter 14 sections technically acceptable, and (2) the staff completes its comprehensive review of Chapter 14 (Action N).

- 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse, the staff found that 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. Therefore, OITS 2641/Q260.67 remained open.

In its December 6, 1996 response to the NRC, Westinghouse stated that "These subsystems will be added to subsection 14.2.9.4.13."



The staff finds Westinghouse's justifications on this issue responsive to the staff's concerns identified in OITS 2641/Q260.67. However, a final determination on this issue will not be made until (1) the staff finds the proposed revisions to relevant Chapter 14 sections technically acceptable, and (2) the staff completes its comprehensive review of Chapter 14 (Action N).

- OITS 2642/Q250.68: 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse, the staff found that 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. Therefore, OITS 2642/Q260.68 remained open.

In its December 6, 1996 response to the NRC, Westinghouse requested that the staff "provide more specific information regarding the comment to include use of 'soft' controls in this test abstract. While the term "soft" is not used in this abstract, the test methods do include the use of "soft" controls during testing of the plant control system hardware and software."

While the staff finds Westinghouse's request for clarification on this issue reasonable, a final determination on this issue will not be made until the staff completes its comprehensive review of Chapter 14 (Action N).

- OITS 2646/Q260.72: Chapter 14 - Initial Test Program. 14.2.8.1.81, 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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."

In its November 8, 1996 response to Westinghouse, the staff found that 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. The staff requested that Westinghouse either specify how the COL applicant can develop test procedures to cover those components, or modify the appropriate test abstracts to reflect these tests. Therefore, OITS 2646 remained open.

In its December 6, 1996 response to the NRC, Westinghouse stated that "Consolidated system level tests encompass multiple functions provided by integrated system assemblies. It is the intent that subsections (a) and (d) of Subsections 14.2.9.2.12, 'Plant Control System. . .' include testing of the signal selector, distributed controllers, process bus multiplexers, etc. as related to Pressurizer Pressure and Level Control as well as other significant PLS functions."

A final determination on this issue will not be made until (1) the staff finds the relevant Chapter 14 sections technically acceptable, and (2) the staff completes its comprehensive review of Chapter 14 (Action N).

- 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.

In its August 13, 1996 response to the NRC, Westinghouse stated that "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"

In its November 8, 1996 response to Westinghouse, the staff found that Section 14.2.9.2.12 had not addressed all the control functions specified in the SSAR. Therefore, OITS 2648/Q260.72 remained open.

In its December 6, 1996 response to the NRC, Westinghouse stated that "The plant control systems functions to be tested are delineated in the

two bullets under the subsection 14.2.9.2.12 labeled 'Purpose' and coincide with the functions listed in SSAR section 7.1.3, first paragraph. While each function is not specifically mentioned in the General Test Methods and Acceptance Criteria of subsection 14.2.9.2.12, the general test methods of paragraphs a), b), c), and d) apply to each function described above."

The staff finds Westinghouse's justifications on this issue responsive to the staff's concerns identified in OITS 2648/Q260.74. However, a final determination on this issue will not be made until (1) the staff finds the relevant Chapter 14 sections technically acceptable, and (2) the staff completes its comprehensive review of Chapter 14 (Action N).

- OITS 2931/Q260.75: This issue has been superseded by NSD-NRC-96-4772, dated 7/16/96. This item is closed.
- OITS 2932/Q260.76: This issue has been superseded by NSD-NRC-96-4772, dated 7/16/96. This item is closed.

**Additional Issues/Comments:**

In its December 6, 1996 response to the NRC, Westinghouse also committed to provide the following information to the staff:

- (a) Westinghouse will provide, in the Chapter 14 Table of Contents, listings of preoperational and startup test descriptions (previously identified as Table 14.2-1 and Table 14.2-2, respectively).
- (b) Westinghouse will provide a comparison table for the startup test abstracts (similar to that included in Attachment 3 to the letter of July 16, 1996 which provided a comparison between RG 1.68, Appendix A, to the Chapter 14 preoperational test abstracts).