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APR 0 2 1993

U.S. Nuclear Regulatory Commission
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Gentlemen:

In the Matter of the Application of	)	Docket Nos. 50-390
Tennessee Valley Authority	)	50-391

WATTS BAR NUCLEAR PLANT (WBN) - INITIAL TEST PROGRAM - FSAR CHAPTER 14 (TAC M82644 and M82645)

References: 1. NRC Letter to TVA, "Request for Additional Information (RAI) on FSAR Chapter 14," July 14, 1992

2. TVA Letter to NRC, "Response to NRC RAI," January 13, 1993

This letter provides TVA's proposed changes to FSAR Chapter 14 for the preoperational phase portion of the initial test program. In Reference 1, NRC documented the staff's evaluation of the subject FSAR amendment and requested additional information needed to complete their review. In Reference 2, TVA responded to the RAI and provided proposed FSAR Chapter 14 preoperational test abstracts (Table 14.2-1) for the staff's review. NRR and Region II personnel have provided comments on TVA's response in recent inspections and several discussions including a telecon of March 9, 1993, during which a general consensus was reached on TVA's proposed resolutions. Specific items addressed in the telecon are summarized in Enclosure 1.

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In order to address NRC's comments, TVA has revised applicable pages of the January 13, 1993 response and provided these under Enclosure 2. Enclosure 3 provides a proposed rewrite of FSAR Chapter 14 and Table 14.2-1 preoperational test abstracts. The following test abstracts were added or revised in response to NRC comments with changes denoted with revision bars:

Residual Heat Removal	Revised
Process and Effluent Radiation Monitoring System	Revised
Diesel Generator System	Revised
Vital 120V AC Power System	Revised
Computer System	Revised
Rod Control System	New
Loose Parts Monitoring System	New
Thermal Expansion System	Revised
Integrated Hot Functional Testing	Revised
AMSAC	Revised

In addition, several abstracts in Enclosure 3 were revised for clarification and/or editorial purposes.

TVA will formally amend FSAR Chapter 14 with these proposed text rewrites and Table 14.2-1 test abstracts in the near future. As stated in Reference 2 and discussed with NRC in a meeting of March 19, 1993, TVA will submit proposed abstracts for power ascension phase tests (Table 14.2-2) by May 15, 1993.

As recently discussed with NRC, the WBN Startup and Test Department has developed a matrix of systems, tests, and related FSAR test summaries to clarify which systems are tested in the preoperational phase test program along with the corresponding FSAR test summary. TVA anticipates that changes to the matrix may occur during the course of implementing the Startup and Test Program. As such, the matrix will be administratively controlled and will be provided to NRC upon request. The current version of the matrix is provided as Enclosure 4.

If you have any questions, please telephone Paul L. Pace at (615) 365-1824.

Very truly yours,

W. J. Museler

William J. Museler

Enclosures
cc: See page 3

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cc (Enclosures):

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INITIAL TEST PROGRAM-FSAR CHAPTER 14

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ENCLOSURE 1
TVA/NRC Telecon - March 9, 1993
FSAR Chapter 14

The following summarizes NRC's review comments/questions on TVA's January 13, 1993 response to NRC's request for additional information (RAI) on FSAR Chapter 14. TVA's response, as discussed in the telecon, is included:

1. TVA's use of "intent" changes should consider changes in test methodology. Response: **The FSAR Section 14.2.3.5 has been revised accordingly.**

2. The RAI response incorrectly identified RG 1.140 date as May 1980. Response: **TVA revised FSAR Section 14.2.7.10 to correctly identify the date as October 1979.**

3. TVA should provide specifics on their plans for testing of the Rod Control System and Loose Parts Monitoring System. Response: **TVA has included new preoperational test summaries for these systems.**

4. The Integrated Hot Functional Test Summary should be revised to identify specifically that "isolation and bypass" valves will be included in the testing. Also revise the RAI response to include reference to the Feedwater and Main Steam Isolation Valve test summary. Response: **Revisions have been made accordingly.**

5. Identify and provide to NRC any past correspondence/documentation on the deletion of the failed fuel detection system. Response: **As discussed in the RAI response (pages 16 and 37), testing of the failed fuel detector will not be performed since the system will not be used at WBN. The system performs no safety function as discussed in the FSAR, Section 9.3.5. TVA will make appropriate changes to FSAR Chapter 9.3.5 to reflect this decision.**

6. NRC requests that TVA provide the matrix of systems, tests, and related FSAR test summaries to clarify which systems will be tested along with the corresponding FSAR test summary. Response: **The matrix has been discussed with NRC. The current version is provided in Enclosure 4 to this letter.**

7. TVA's response No. 1 to RAI question 7.d (FSAR Section 14.2.1) should be revised to clarify that the words "non-safety related" apply to both systems and design features. Response: **FSAR section 14.2.1 has been revised such that the clarification is not applicable.**

8. The Last sentence in FSAR Section 14.2.1 should be revised to change the reference in this sentence from "14.2.12" to "Table 14.2-1." Response: **Revised accordingly.**

ENCLOSURE 1
TVA/NRC Telecon - March 9, 1993
FSAR Chapter 14

9. The RAI response concerning performance of a structural integrity test was ambiguous. Response: As discussed in the phone call, the Unit 1 test was performed and will not be reperformed. Since Chapter 14 does not take exception to this test for Unit 2, it is required. However, the RAI response has been revised to specifically state this test will be performed for Unit 2 as part of the Unit 2 initial test program.

10. NRC needs more technical justification for not doing power coefficient checks at various power levels. Response: As discussed with NRC and explained in the RAI response, the value of performing this test is exceeded by the difficulty in obtaining an empirical measurement. At other facilities, the ability to analytically predict this design parameter has been demonstrated.

11. RCS flow measurement testing should be initially performed at low power levels. Response: TVA noted that RCS Flow Measurement is calculated using RCS elbow tap differential pressure measurements prior to initial criticality. FSAR Section 14.2.11 has been revised accordingly.

12. Clarifications required concerning DG Testing. Response: TVA has revised the Diesel Generator FSAR test summary and RAI response to clarify that the specified DG testing applies to each of the five DGs at WBN. In addition, TVA has revised the Diesel Generator Test Summary to reduce the number of starts required for reliability testing from 35 to 23. This is consistent with previous testing requirements at WBN.

13. Clarifications required concerning RHR mid-loop operation testing. Response: TVA has revised the RHR FSAR test summary to include mid-loop operation.

14. General - TVA has revised the RAI response to specifically identify any test summaries that are not being changed as part of the RAI response.

15. NRC has some concern about the level of detail in test acceptance criteria and test summaries for: Computer System, AMSAC, and Thermal Expansion. Response: TVA has revised these summaries to provide additional detail and/or more clearly specify acceptance criteria/test methodology.

16. Provide technical rational for not doing electrical bus tests and min/max voltage to assure functionality of connected loads. Response: NRC withdrew this question stating TVA's approach is acceptable. No action required.

ENCLOSURE 2

TVA'S JANUARY 13, 1993 RESPONSE TO NRC'S RAI ON FSAR CHAPTER 14

REVISED PAGES ONLY

Revised Pages: 1, 3, 11, 13, 15, 16, 19-22, 24, 25, 30, 34, 37, 44, 45

PART 1

1. Section 14.2.1, "Summary of Test Program and Objectives" was rewritten to describe the overall purpose, direction, and management of the Initial Test Program (ITP). The changes to this section include that preoperational testing will be completed prior to fuel load with certain limited exceptions where tests or parts of tests may be deferred into the power ascension phase. Section 14.2.1 should be modified to state that completion of the preoperational testing phase (including review and approval of the test results) is required prior to fuel loading and if portions of any preoperational tests are intended to be conducted or their results approved after fuel loading to:

   (1) List each test,
   (2) State which portions of each test will be delayed until after fuel loading,
   (3) Provide technical justification for delaying these portions, and
   (4) State the power levels where each test will be completed.

   Response:

   The fourth paragraph of FSAR Section 14.2.1 will be revised to read as follows:

   "Tests summarized in Table 14.2-1, will be completed and test results approved prior to commencing fuel load. Any tests, or portions thereof, which can not be completed prior to fuel load will be evaluated to assure incomplete tests will not adversely affect fuel loading operations or cause features that have not been tested to be relied upon for safe plant operation. The Joint Test Group (JTG) and the Plant Operating Review Committee (PORC) will review and approve the technical justification for delaying test completion until after fuel load. If approved by the PORC, the technical justification and schedule, including power level for completion of delayed testing, will be provided to the NRC staff prior to fuel load."

3. Subsection 14.2.3.5, "Test Procedure Revisions/Changes" describes different requirements for the level of approvals for changes to preoperational test procedures and power ascension test procedures depending on whether the change involves a change to the intent or not. The criteria for determining what constitutes a change to intent has not been provided. Subsection 14.2.3.5 should be modified to define changes to the intent, (e.g., any change that affects ITP FSAR commitments) so that consistent criteria are applied in determining which test procedure changes involve changes to the intent and therefore obtain approval levels that are consistent.

Response:

WBN considers an "intent" change to be changes to the test methods, objectives, or acceptance criteria that affect TVA's ITP commitments as specified in the FSAR.

FSAR Section 14.2.3.5 will be revised to read as follows:

"Revisions to preoperational and power ascension test procedures will be reviewed and approved in accordance with Section 14.2.3.3 prior to use.

Changes to preoperational and power ascension test procedures, required during test performance, will be classified as intent or non-intent changes. Intent changes are changes to test methods, objectives, or acceptance criteria that affect Initial Test Program commitments as described in the FSAR. Non-intent changes are changes of any other type.

Preoperational and power ascension test procedure changes required during test performance will be approved prior to implementation of the change, as follows:

1. Preoperational Test Procedures

a. Changes to test procedures that change the intent of the test will be reviewed and approved in the same manner as the original test procedure, as described in Section 14.2.3.3.

b. Changes to test procedures that do not change the intent of the test will be approved by the assigned test engineer and another individual qualified, as described in Section 14.2.2.7, for review and approval of the test procedure.

c. All procedure changes will be included with the completed procedure and be subject to review with the test results as described in Section 14.2.5.

2. Power Ascension Test Procedures

a. Changes to initial power ascension tests that do not change the intent of the test will have the Shift Supervisor's concurrence and approval of the person in charge of the test.

b. Changes to initial power ascension tests that change the intent of the test will be reviewed and approved in the same manner as the original test."

4. RG 1.140, "Design, Testing, and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants", Revision 1, October 1979.

Response:

FSAR Section 14.2.7 will be revised to add RG 1.140, Revision 1 (October 1979). A new paragraph, 14.2.7.10, will be added to read as follows:

" 10. RG 1.140, " Design, Testing, and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants"

Discussion: Testing of normal (non-safety related) ventilation exhaust filtration systems will be performed in full compliance with guidance provided by this Regulatory Guide."

b. Regulatory Guide 1.68, "Initial Test Program for Water-Cooled Nuclear Power Plants" was changed from a position of full compliance to take various exceptions (Section 14.2.7.4.a). Under Regulatory Position C.1, certain comments are referred to as "clarifications" when they in fact are either alternate approaches or exceptions. These comments should be described as such and categorized in the appropriate discussion area.

Response:

The change from full compliance with RG 1.68, Revision 0, to compliance with RG 1.68, Revision 2 (with exceptions), does not reduce WBN's commitment to perform preoperational tests of all safety related components, systems, and structures and appropriate tests of non-safety related systems. WBN is committed to use RG 1.68, Revision 2, for development and conduct of the initial test program. Section 14.2.7 will be revised to clearly identify and differentiate all exceptions and alternate approaches to the regulatory guidance. The following revisions will be made:

c. All of the items of Regulatory Guide 1.68, Appendix A, were not addressed in either the exceptions to Regulatory Guidance or in the individual test summaries provided under Tables 14.2-1 and 14.2-2 (Section 14.2.7, 4.a). For the following items from Regulatory Guide 1.68, Appendix A, either 1) modify Section 14.2.7 to provide appropriate technical justifications for exceptions to these items, 2) modify existing or add additional test summaries to address these items, and/or 3) explain where existing test summaries address these 25 items:

1.b.1, 1.d.10, 1.h.6, 1.i.13, 1.i.15, 1.i.21, 1.j.7, 1.j.8, 1.j.9, 1.j.11, 1.l.4, 1.l.5, 1.m.3, 1.m.6, 1.n.15, 1.n.16, 4.l, 4.n, 5.n, 5.q, 5.r, 5.w, 5.x, 5.ee, 5.ff.

Response:

The 25 items in question are responded to as follows:

1. **1.b.1 - The FSAR, Table 14.2-1 has been revised to include a preoperational test summary for the Rod Control System. Proper operation of the complete system will be demonstrated after fuel load during the power ascension test phase as described in the test summary provided in Table 14.2-2.**

2. **1.d.10 - Emergency cooling towers are not included in the WBN design.**

3. **1.h.6 - Preoperational testing of the air return fans will be performed as described in the Containment Ventilation System test summary provided in Table 14.2-1.**

4. **1.i.13 - A containment inerting system is not included in the WBN design.**

5. **1.i.15 - The WBN design does not include a containment penetration pressurization system.**

6. **1.i.21 - The WBN design does not include a containment penetration cooling system.**

15. 1.n.15 - WBN design does not include a shield cooling system. The space between the reactor vessel and shield wall in containment is cooled by the lower compartment air cooling system in conjunction with the CRDM air cooling system. Performance of these systems will be demonstrated during Integrated Hot Functional Testing. The test summary for Containment Ventilation has been revised to clarify test requirements to verify proper cooling of the space around the reactor vessel.

16. 1.n.16 - A separate cooling system for the RWST is not included in the WBN design. Testing of RWST immersion heaters has been included in the revised Safety Injection System Test summary in Table 14.2-1.

17. 4.l - Operability, including stroke times, of main steam line and branch steam line valves and bypass valves used for protective isolation functions will be demonstrated at rated temperature and pressure conditions during Hot Functional Testing. The test summary for Integrated Hot Functional Testing has been revised to clarify test requirements for steam line valves which provide protective functions. The Main Steam and Feedwater Isolation Valves Test Summary also addresses these valves.

18. 4.n - Performance of the Process Computer System will be demonstrated prior to fuel load. Refer to the Process Computer Preoperational Test Summary provided in Table 14.2-1.

19. 5.n - Table 14.2-1 will be revised to include a test summary for the Loose Parts Monitoring System. In addition, Table 14.2-2 will be revised to include a power ascension test for the Loose Parts Monitoring System.

20. 5.q - Testing of the failed fuel detector will not be performed since the system will not be used at WBN. TVA will make appropriate changes to FSAR Chapter 9.3.5 to reflect this decision.

21. 5.r - Preoperational testing of the process computer validates performance calculations and verification of proper input sources. A test summary for the Computer System is provided in Table 14.2-1. The power ascension test summary for Thermal Power Measurement and Statepoint Data Collection provided in Table 14.2-2 will be revised to address collection of process computer data and comparison to plant indications.

22. 5.w - Adequate cooling of the space around the reactor vessel will be demonstrated during Integrated Hot Functional Testing. See response to item 15 (1.n.15) above.

23. 5.x - WBN does not intend to provide a test summary for this item nor take exception to this item since these functions will be confirmed through normal plant tests.

Initial performance testing of the "Auxiliary Systems" defined in paragraph 5.x are conducted during the preoperational test phase prior to fuel load. Refer to the Table 14.2-1 test summaries for the following systems:

Essential Raw Cooling Water
Component Cooling Water
Diesel Generator Building Ventilation
Control Building Ventilation
Auxiliary building Ventilation

d. For RG 1.68, Appendix A, exception is taken to performing preoperational tests for various designated items and the components and systems associated with these items (Section 14.2.7.4.a(2)). This change states that these components and systems perform no safety-related function and are not required for safe shutdown and cooldown of the reactor under normal or upset conditions as described in the applicable sections of the FSAR. This change states that "Acceptance Testing" as described in FSAR Section 14.2.1 will be performed in accordance with applicable startup administrative procedure requirements for these components and systems. Section 14.2.4, "Conduct of Test Program" and Section 14.2.5, "Review, Evaluation, and Approval of Test Results" do not address "Acceptance Testing" but do describe "Component Testing" and "Preoperational Testing". Regulatory Guide 1.68 allows for applications of a graded approach to the ITP. A graded approach for the components and systems to be tested by "Acceptance Testing" would be acceptable if the guidance provided in RG 1.68, Appendix A is addressed by incorporating "Acceptance Tests" into the ITP to verify proper operation of these components and systems. Sections 14.2.4, 14.2.5, 14.2.7, and the individual test summaries described in Tables 14.2-1 and 14.2-2 should be modified to address the "Acceptance Test" process and to provide specific test abstracts for the noted components and systems.

Response:

It is noted that section 14.2.7.4.a(2) has been deleted as discussed in response to request 7.b above. However, the following provides an explanation for WBN's performance of Acceptance Tests (instead of preoperational tests) on certain systems which are identified in Appendix A of RG 1.68 R-2 which, by WBN design, are relied upon for safe shutdown of the reactor under normal conditions. These tests have been completed or are currently in progress.

The following information is provided for clarification. The nonsafety-related AC Distribution System is used for safe shutdown of the reactor under <u>normal</u> conditions thus subject to the requirements applicable to preoperational testing as described by the current test program. Acceptance Tests in lieu of Preoperational Tests were completed on the nonsafety-related AC Distribution System. These nonsafety-related AC system tests were planned and were either performed or in progress after submittal of FSAR Amendment 69 but prior to receipt of the NRC Request for Additional Information. While the test procedures used are referred to as Acceptance Tests, they were processed in the same manner as Preoperational Test with exception to 30-day prior submittal to NRC. The test procedures were reviewed and approved by Joint Test Group members and others, whose qualifications either meet or exceed the minimum qualifications for review and approval of preoperational test procedures, as described in FSAR Section 14.2.2.7. Additionally, the tests were performed by personnel whose qualifications meet or exceed the minimum qualifications required for performance of preoperational tests, as described by FSAR Section 14.2.2.7. Since controls applied to the review, approval, and performance of the tests are equivalent to current requirements for preoperational tests, WBN does not intend to repeat them for purpose of name revision. Similarly, Acceptance Testing of the 250 Volt DC Power System, currently in progress, will not be repeated.

The following FSAR changes will be made to include additional non-safety related components, systems, and design features in the initial test program, describe the acceptance testing process, and to clarify requirements applicable to the tests summarized in Table 14.2-1:

1. Replace the third paragraph of Section 14.2.1 in its entirety with the following new paragraph:

"The initial test program is divided into two phases, the preoperational test phase and the power ascension test phase. Preoperational phase testing will be performed prior to fuel load and power ascension testing will be performed during and following fuel loading activities. During each of these two phases, tests will be performed to verify design requirements of safety related and selected non-safety-related components, systems, and structures. A graded approach, based on criteria provided in Regulatory Guide 1.68, Revision 2, will be used for selection of plant structures, systems, components, and design features to be included in the initial test program. During the preoperational testing phase, three types of tests will be performed; (1) component tests, (2) preoperational tests, and (3) acceptance tests.

Component (preliminary) tests will be performed on safety related and non-safety-related components and consist of items such as instrument calibration, flushing, cleaning, and functional tests of individual components to demonstrate conformance with design requirements. Component testing will prepare individual components for system level testing. Verification that appropriate component testing is complete is prerequisite to performance of preoperational (system level) tests as described in Section 14.2.12.1.

Preoperational tests will be performed on safety related and selected non-safety related structures, systems, components, and design features as required to demonstrate their capability to perform in accordance with design requirements. Preoperational tests are intended to demonstrate the proper operation of system design features through integrated operation of components under normal and transient conditions, where practical, including system and component interactions. Such tests also demonstrate the capability of certain component design features for which system operation is required to establish the necessary test conditions. Summaries of preoperational tests are provided in Table 14.2-1.

Acceptance tests will be performed on components and systems which do not perform a safety-related function and are not required for safe shutdown and cooldown of the reactor under normal or upset conditions as described in the applicable sections of the FSAR. Acceptance tests are not summarized in Table 14.2-1.

Components and systems which are not tested in accordance with a preoperational or acceptance test procedure will be tested and/or placed into service in accordance with procedures which are appropriate for the installation.

During the power ascension testing phase, power ascension tests, surveillance test instructions, and other permanent plant test and technical instructions will be performed to demonstrate satisfactory operation of systems. Summaries of power ascension tests to be performed during the initial test program are provided in Table 14.2-2.

Regulatory guidance will be used for development of initial test program requirements as discussed in Section 14.2.7."

2. Revise the first sentence of the first paragraph of Section 14.2.3.1 to read, "Tests will be performed in accordance with approved procedures."

3. Replace the first and second paragraphs of Section 14.2.3.3 with the following:

   "An independent technical review of component and acceptance test procedures by qualified personnel will be performed prior to approval by the Startup Manager. The Startup Manager may request additional review as he deems appropriate.

   Preoperational test procedures will be reviewed by personnel who are assigned to JTG member organizations and qualified for review of preoperational test procedures as described by Section 14.2.2.7. The Startup Manager may request additional review to be performed as he deems appropriate. Preoperational test procedures will be approved by the Startup Manager after recommendation for approval by the JTG."

4. Revise the first sentence of Section 14.2.3.4 to read, "Test procedures will be...."

5. Revise the first sentence of Section 14.2.3.5 to read, "Test procedure revisions will...."

6. Revise the second sentence of Section 14.2.3.5 to read, "Test procedure changes required during...."

7. Section 14.2.4.2 will be revised as follows:

   Revise the first sentence to read: "Upon completion of construction phase activities, the Startup and Test organization will conduct appropriate component tests and acceptance or preoperational tests."

   Add the following sentence to the end of Section 14.2.4.2: "Appropriate component tests will be performed prior to the performance of preoperational or acceptance tests."

8. Revise the first and second paragraphs of Section 14.2.4.7 to delete the term "safety-related".

9. Revise the first sentence of Section 14.2.10 to read, "Fuel loading will begin after review and approval of the results of tests summarized in Table 14.2-1."

10. **New test summaries have been added to Table 14.2-1 to address testing of the following non-safety related systems:**

    a. **Condensate and Condenser Vacuum System**
    b. **Feedwater System**
    c. **Main Steam System**
    d. **Circulating Water System**
    e. **Steam Generator Blowdown System**

11. **Revise the title of section 14.2.4.3 to read, "Preoperational and Acceptance Testing"**

12. **Revise section 14.2.5 as follows:**

    Add new second sentence to read, "Acceptance test data packages will be independently reviewed as assigned by the Startup Manager."

    Revise the first sentence of fourth paragraph to read, "The responsibility for final approval of acceptance and preoperational test results rests with the Startup Manager."

e. For RG 1.68, Appendix A, Item 1.a.2.d, 1.d.2, 1.d.3, and 1.e.4, exception is taken regarding testing of pressure safety and relief valves for the reactor coolant system and the main steam system (Section 14.2.7.4.a(3)). This Section should be modified to commit to either 1) conduct inplace preoperational testing of Reactor Coolant System and Main Steam System power operated relief valves, 2) provide vendor data that substantiates proper performance of these valves under design conditions, or 3) reference current analysis that determines the proper performance of these valves under design conditions (e.g., analysis provided in Q/R 413.07 for current conditions).

Response:

Preoperational testing of the Main Steam System and Reactor Coolant System power operated relief (and safety) valves are described in preoperational test summaries, "Steam Generator Safety and Relief Valves" and "Pressurizer Safety and Relief Valves", provided in Table 14.2-1. The tests described, are considered to be appropriate for these components and to be in compliance with the intent of Regulatory Guide 1.68, Revision 2. Section 14.2.7.4.a (3) was included to provide clarification that inplace capacity tests of these valves will not be performed. Since exception is not taken to Regulatory Guide 1.68, the FSAR has been revised to delete Section 14.2.7.4.a (3).

g. For RG 1.68, Appendix A, Item 1.i.1, exception is taken regarding the Containment design overpressure structural tests for Unit 1 (Section 14.2.7.4.a(5)). The status of testing on Unit 2 is unclear. This Section should be modified to state that this testing will performed for Unit 2.

Response:

The FSAR has been revised to delete Section 14.2.7.4.a (5). The original intent was to clarify that WBN did not plan to repeat the Structural Integrity Test previously performed on Unit 1 containment. This position, however, is not an exception to RG 1.68, thus, paragraph 14.2.7.4.a (5) is not required. A Structural Integrity Test will be performed on Unit 2 containment prior to Unit 2 fuel loading.

h. For RG 1.68, Appendix A, Items 1.i.1, 1.m.1, 1.m.4, and 1.o.1, exceptions are taken based on testing already completed (Section 14.2.7.4.a(5), 4.a(8), and 4.a(9)). For such cases, the exceptions should verify that testing previously completed conforms to the applicable Regulatory Guidance with test results that satisfy acceptance criteria. Exceptions to performing such tests upon resumption of the ITP schedule are acceptable, however these exceptions should indicate that retesting will be performed as may be necessary for modifications performed since the test was completed that could impact the acceptability of the test results.

Response: The FSAR, Section 14.2.7, has been revised to delete subparagraphs 4.a(5), 4.a(8), and 4.a(9) as discussed in item 7.b and 7.g above. Any previously performed tests for which credit will be taken to satisfy a regulatory testing commitment will be evaluated for compliance with applicable regulatory guidance and test acceptance criteria. Test procedure deviations from regulatory requirements, unacceptable test results, and post-test modifications will be evaluated to determine retest requirements.

i. For RG 1.68, Appendix A, Item 5.a, exception is taken regarding power reactivity coefficient testing at 25%, 50%, 75%, and 100% to omit these tests based on previous plant core designs having validated analytical models used for design parameters and plant testing having assured that actual core designs agree with plant parameters (Section 14.2.7, 4.a(21)). This Section should be modified to state that power reactivity coefficients will be determined to be in accordance with design at the recommended power levels.

Response:

WBN continues to take exception to RG 1.68, Appendix A, subparagraph 5.a. The NRC staff expressed agreement in SER Supplement 3, that a proposed reduced power coefficient measurement is acceptable and that this test at 25%, 50%, and 75% is not required. WBN now also takes exception to the 100% power coefficient measurement. The basis for this exception is the fact that these tests were completely exempted from the test program at a similar recently licensed plant and that analytical predictions for this measurement have been previously verified at similar plants. This test was not performed during the recent initial startup of Comanche Peak Unit 1. The FSAR has been revised to provide additional justification for this exception. Section 14.2.7.4.a(21) [new paragraph 14.2.7.4.a(16)] will be revised to read as follows:

"Power reactivity coefficients will not be determined at 25%, 50%, 75%, and 100% power levels. The power coefficient is not directly measured but is inferred. The required measurement for the test is time consuming compared with the value of the data obtained. The measurement has been previously deleted at other plants based on inferred measurements at similar plants. WBN is similar to Sequoyah Units 1 & 2 and McGuire Units 1 & 2. The power coefficient (Doppler coefficient) was inferred and compared with design values in three of these four units. The comparison between the inferred measurements and design values was within acceptance criteria in all cases thus demonstrating the ability to analytically predict this design parameter."

8. Section 14.2.11, "Test Program Schedule", was rewritten describing the testing sequence and progression. This change includes a statement that detailed schedules for testing will be reviewed to assure that tests were properly sequenced to provide assurance that untested safety features are not relied upon for safe operation of the plant. This Section states that plant structures, systems, and components which are relied upon to prevent or mitigate consequences of postulated accidents will be fully tested to the extent practical prior to exceeding 50 percent power level. Section 14.2.11 should be modified to make allowance, only when no reasonable alternative exists, for the potential need to proceed into low power testing up to the 25 percent power testing plateau, prior to completing testing of structures, systems, and components, which are relied upon to prevent or mitigate consequences of postulated accidents. Allowing reliance on structures, systems, and components up to the 50 percent power level, if prior testing is not practical, is contrary to the intent of the schedule review to assure that tests are sequenced such that untested safety features are not relied upon for safe operation of the plant.

Response:

Revise the last sentence, first paragraph of Section 14.2.11 to read as follows:

" Plant structures, systems, and components which are relied upon to prevent or mitigate consequences of postulated accidents will be fully tested to the extent practical prior to exceeding the five percent power level. This testing includes an RCS flow measurement using RCS elbow tap differential pressure measurements and engineering calculations prior to initial criticality. However, those testing activities which cannot reasonably be performed below the five percent power level will be fully tested to the extent practical prior to exceeding the 30 percent power level with the exception of the RCS Calorimetric Flow Measurement test which is performed at the 50 percent power level consistent with Westinghouse scoping documents."

1.b Reactivity Control Systems

(1) Control Rod System Tests:

A test summary is not provided for this system. A preoperational test is normally conducted to ensure that the rod control system is ready to support core loading and further rod testing.

The rod control system should not delay a smooth transition through the modes (6, 5, etc.). (See Vogtle, Harris, Catawba preop programs where as much of the rod control system as possible was tested prior to core loading.)

Response: **The FSAR, Table 14.2-1 has been revised to include a preoperational test summary for the Rod Control System. Proper operation of the total Rod Control System will be demonstrated during and after fuel load during the Power Ascension test phase as described by the Rod Control System test summary in Table 14.2-2. This approach is consistent with the NSSS vendor's test specification for the system.**

(3) Standby Liquid Control System Tests:

Should state not applicable.

Response: **A Standby Liquid Control System is not included in the WBN design.**

1.d Residual or Decay Heat Removal Systems

(2) Steam Line Atmospheric Dump Valves:

Not clearly identified in a test summary. FSAR paragraph 14.2.7.4.a (2) does not list these components as receiving an acceptance test. Apply (1), (2), (3) above as appropriate.

Response: **Preoperational tests of the steam line atmospheric dump valves (Steam Generator Power Operated Relief Valves) are described in the Test Summary "Steam Generator Safety and Relief Valves" provided in Table 14.2-1.**

(21) Containment Penetration Cooling System Tests:

Not clearly identified in a test summary. Apply (1), (2), (3) above as appropriate.

Response: **A containment penetration cooling system is not included in the WBN design.**

1.j Instrumentation and Control Systems

(4) Recirculation Flow Control System

Should state not applicable.

Response: **Recirculation Flow Control is not included as a WBN design feature.**

(7) ECCS Leak Detection System:

Not clearly identified in a test summary. Apply (1), (2), (3) above as appropriate.

Response: **See response to Part 1, item 7.c (1.j.7), Page 14.**

(9) Pressure Control System Maintain D/P Across Boundary Valves:

Not clearly identified in a test summary. Apply (1), (2), (3) above as appropriate.

Response: **Pressure control systems used to maintain differential pressure across boundary valves are not included in the WBN design.**

(12) Failed Fuel Detection System:

Not clearly identified in a test summary. Apply (1), (2), (3) above as appropriate.

Response: **Testing of the failed fuel detector will not be performed since the system will not be used at WBN.**

ENCLOSURE 2

TABLE 14.2-1 TEST SUMMARY ADDITIONS AND REVISIONS

Revised Test Summaries:

* Essential Raw Cooling Water System
* Primary Makeup Water System
  Component Cooling Water System
* Process Sampling System
* Post Accident Sampling System
* Liquid Waste Drain, Collection and Transfer System
* Fire Protection System
* Spent Fuel Pool Cooling System
* Residual Heat Removal System
* Chemical and Volume Control System
* Flood Mode Boration
* Boron Recycle System
* Safety Injection System
  Containment Spray System
  Integrated Engineered Safety Features System Actuation
* Liquid Waste Processing System
* Solid Waste Processing System
  Gas Waste Processing System
* Process and Effluent Radiation Monitoring System
  Area Radiation Monitoring System
  Control Building Ventilation System
  Auxiliary Building Ventilation and Post Accident Sampling Environmental Control System
  Containment Ventilation System
  Combustible Gas Control System
  Secondary Containment Ventilation System
  Diesel Generator Building Ventilation System
* Diesel Generators
  AC Power Distribution System
  DC Power Distribution System
* Vital 120V AC Power System
  Emergency Lighting System
  Communication System
  Reactor Protection System
  Reactor Pressure Boundary Leakage Detection System
  Excore Nuclear Instrumentation System
* Seismic Instrumentation System
* Steam Generator Safety and Atmospheric Relief Valves
  Main Steam and Feedwater Isolation Valves
  Auxiliary Feedwater System
  Fuel Handling and Vessel Servicing Equipment
  Reactor Coolant System Cold Hydrostatic Test
* Integrated Hot Functional Tests
  Operational Vibration Testing
  Containment Integrated Leak Rate Test

(*) Revisions/additions made since TVA's January 13, 1993, response to NRC's RAI. Test summaries are contained in Enclosure 3.

ENCLOSURE 2

TABLE 14.2-1 TEST SUMMARY ADDITIONS AND REVISIONS

Revised Test Summaries: (continued)

Containment Isolation
Compressed Air System
Ice Condenser
* Pressurizer Safety and Relief Valves
Intake Pump Station Ventilation
* Thermal Expansion
* Computer System
* Anticipated Transient Without Scram Mitigation System Actuation Circuitry

New Test Summaries:

Steam Generator Blowdown System
Main Steam System
* Feedwater System
* Condensate and Condenser Vacuum System
Circulating Water System
* Rod Control System
* Loose Parts Monitoring System

Unchanged Summaries:

Containment Local Leak Rate Tests
Inadequate Core Cooling Monitor System

ENCLOSURE 3

FSAR CHAPTER 14 AND TABLE 14.2-1 (PREOPERATIONAL TEST ABSTRACTS)

PROPOSED CHANGES

Note: Revision bars are provided only for test summaries revised/added since TVA submitted the January 13, 1993 response to NRC's RAI

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14.3 Prestart Test Program (Deleted)

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Table 14.2-2 Power Ascension Test Summaries

14.0 INITIAL TEST PROGRAM

14.1 NOT REQUIRED FOR FINAL SAFETY ANALYSIS REPORT

This section is not applicable; see Section 14.2 for specific information.

14.2 TEST PROGRAM

14.2.1 Summary of Test Program and Objectives

The purpose of the initial test program for the Watts Bar Nuclear Plant (WBN) is to assure that the installed plant structures, systems, and components will be subjected to tests as required to verify that the plant has been properly designed and constructed and is ready to operate in a manner that will not endanger the health and safety of the public, and to provide assurance of total plant reliability for operation. The test program will also ensure, to the extent practical, that the procedures for operating the plant safely have been evaluated and demonstrated and that the operating organization is knowledgeable about the plant and procedures.

The necessary procedures to control, implement, and document the test program are established by startup and plant administrative procedures and summarized in the following sections. Tennessee Valley Authority (TVA), as the applicant, has responsibility for overall direction and management of the test program.

The initial test program is divided into two phases, the preoperational test phase and the power ascension test phase. Preoperational phase testing will be performed prior to fuel load and power ascension testing will be performed during and following fuel loading activities. During each of these two phases, tests will be performed to verify design requirements of safety related and selected non-safety-related components, systems, and structures. A graded approach, based on criteria provided in Regulatory Guide 1.68, Revision 2, will be used for selection of plant structures, systems, components, and design features to be included in the initial test program. During the preoperational testing phase, three types of tests will be performed; (1) component tests, (2) preoperational tests, and (3) acceptance tests.

Component (preliminary) tests will be performed on safety related and non-safety-related components and consist of items such as instrument calibration, flushing, cleaning, and functional tests of individual components to demonstrate conformance with design requirements. Component testing will prepare individual components for system level testing. Verification that appropriate component testing is complete is prerequisite to performance of preoperational (system level) tests as described in Section 14.2.12.1.

Preoperational tests will be performed on safety related and selected non-safety related structures, systems, components, and design features as required to demonstrate their capability to perform in accordance with design requirements. Preoperational tests are intended to demonstrate the proper operation of system design features through integrated operation of components under normal and transient conditions, where practical, including system and component interactions. Such tests also demonstrate the capability of certain component design features for which system operation is required to establish the necessary test conditions. Summaries of preoperational tests are provided in Table 14.2-1.

Acceptance tests will be performed on components and systems which do not perform a safety-related function and are not required for safe shutdown and cooldown of the reactor under normal or upset conditions as described in the applicable sections of the FSAR. Acceptance tests are not summarized in Table 14.2-1.

Components and systems which are not tested in accordance with a preoperational or acceptance test procedure will be tested and/or placed into service in accordance with procedures which are appropriate for the installation.

During the power ascension testing phase, power ascension tests, surveillance test instructions, and other permanent plant test and technical instructions will be performed to demonstrate satisfactory operation of systems. Summaries of power ascension tests to be performed during the initial test program are provided in Table 14.2-2.

Regulatory guidance will be used for development of initial test program requirements as discussed in Section 14.2.7.

Tests summarized in Table 14.2-1 will be completed and test results approved prior to commencing fuel load. Tests, or portions thereof, which can not be completed prior to fuel load will be evaluated to assure incomplete tests will not adversely affect fuel loading operations or cause features that have not been tested to be relied upon for safe plant operation. The Joint Test Group (JTG) and the Plant Operating Review Committee (PORC) will review and approve the technical justification for delaying test completion until after fuel load. If approved by the PORC, the technical justification and schedule, including power level for completion of delayed testing, will be provided to the NRC staff prior to fuel load.

Power ascension tests will be performed beginning with activities leading to fuel loading and ending with full power operation. The intent of these tests is to assure that fuel loading is effected in a safe manner; that tests deferred from the preoperational test phase are completed satisfactorily; that the plant is safely brought to rated capacity; that plant performance is satisfactory in terms of established design criteria; and to demonstrate, where practical, that the plant is capable of withstanding anticipated transients and postulated accidents. Testing activities related to fuel load and initial criticality are further described in Section 14.2.10.

Tests will be conducted in accordance with approved test procedures. Review, approval, and revision of test procedures and the evaluation and disposition of test results will be accomplished by methods specified in the appropriate administrative procedures summarized in Section 14.2.3. Preoperational and power ascension tests are discussed in Section 14.2.12.

The initial test program will utilize, to the extent practical, operations personnel and operating procedures to provide familiarization with the plant installation and demonstrate the adequacy of operating procedures.

Preoperational testing activities will be coordinated through a Joint Test Group (JTG), as described in Section 14.2.2.5. Power ascension testing activities will be coordinated through the Plant Operations Review Committee (PORC), as described in Section 14.2.2.6.

14.2.2 Organization and Staffing

The Site Vice President has overall responsibility for the initial test program. Implementation of the initial test program is the responsibility of the Plant Manager.

The Plant Manager reports to the Site Vice President and has overall responsibility for component, acceptance, and preoperational testing performed by the Startup and Test organization.

The Plant Manager also has overall responsibility for Power Ascension testing performed by the Technical Support organization.

Responsibilities of the Startup and Test and Plant Operating organizations and personnel are discussed below.

14.2.2.1 Startup and Test Organization

The Startup and Test organization consists of management personnel, system test engineers, and support personnel necessary to conduct preoperational test phase activities.

The Startup Manager reports to the Plant Manager and is responsible for management of the Startup and Test organization. Reporting to the Startup Manager for test-related activities is the Startup Test Manager and the Joint Test Group Chairman. Other non-test functions reporting to the Startup Manager are described in the startup administrative procedures.

Responsibilities of the Startup Manager, Startup Test Manager, and system test engineers are provided below. Responsibilities of the Joint Test Group are described in Section 14.2.2.5.

14.2.2.1.1 Startup Manager

The Startup Manager is responsible for the overall management of the Startup and Test organization including coordination and implementation of component, acceptance, and preoperational test activities. The responsibilities of the Startup Manager include:

1. Development, approval, and implementation of the WBN Startup administrative procedures manual;

2. Selects Startup Representatives for the JTG.

3. Development of plans and schedules for component, acceptance, and preoperational testing activities;

4. Analysis of system completion schedules for compatibility with testing schedules and implementation of corrective actions to minimize conflicts;

5. Submittal of proper and timely notifications and reports (pertaining to component and preoperational testing activities) to the Nuclear Regulatory Commission and other regulatory agencies; and,

6. Assuring proper review of preoperational test procedures and results.

14.2.2.1.2 Startup Test Manager

The Startup Test Manager reports to the Startup Manager and is responsible for supervision of all component, preoperational, and acceptance testing personnel. The responsibilities of this position are:

1. Reviewing of startup administrative procedures;

2. Supervising the development and conduct of individual component, acceptance, and preoperational test procedures;

3. Assuring testing activities are conducted in accordance with the Startup Manual and applicable WBN administrative procedures;

4. Coordinating test program activities and requirements with appropriate Engineering, Construction, Operations, Maintenance, and Technical Support groups; and,

5. Providing technical direction to system test engineers and others assigned to the Startup and Test Group.

14.2.2.1.3 System Test Engineers

System Test Engineers are members of the Startup and Test organization and report through a discipline group supervisor to the Startup and Test Manager. Their duties and responsibilities include:

1. Preparation of assigned test procedures which direct and guide specific tests in accordance with a standard format;

2. Performance of component, acceptance and preoperational tests;

3. Direction of support personnel during performance of tests including appropriate interface with plant operators;

4. Ensuring the safety of personnel and plant equipment during testing;

5. Familiarization of support personnel with specific tests;

6. Identification of deficiencies that could adversely affect test performance;

7. Assembly of test data and preparation of test reports for evaluation by others; and,

8. Authority to disallow or terminate testing due to conditions which could endanger personnel or equipment.

14.2.2.2 Plant Operating Organization

The Plant Operating organization is described in Chapter 13. With regard to the initial test program, the Plant Manager reports to the Site Vice President and is responsible for overall management of component, acceptance, preoperational, and power ascension testing.

The WBN operating staff will be involved in the test program in several capacities throughout the initial test program. This involvement will include review of test procedures and results and the direct participation of operating personnel in test activities. TVA Watts Bar maintenance personnel will be responsible for assisting test engineers in performing tests and for performing routine preventive and corrective maintenance activities on plant components when they are under the jurisdictional control of the Startup and Test Group. Plant operators will assist test engineers in performing tests and will take over the routine operations of systems when authorized by Startup and Test. The operating staff will direct fuel loading and will be responsible for operation and testing of the plant during the power ascension test phase.

14.2.2.2.1 Technical Support Manager

The Technical Support Manager reports to the Plant Manager and will supervise all power ascension testing personnel assigned to Technical Support. The responsibilities of the Technical Support Manager for the power ascension testing program include:

1. Overall coordination and direction of power ascension testing and related activities;

2. Development and implementation of plans and schedules for the power ascension test phase;

3. Development of power ascension test procedures;

4. Assuring proper review of test procedures and results;

5. Assuring proper and timely notifications and reports pertaining to power ascension testing activities are submitted to the Nuclear Regulatory Commission and other regulatory agencies; and,

6. Performance of the power ascension test sequence to ensure a safe and orderly power ascension program.

14.2.2.2.2 Power Ascension Test Engineers

Power Ascension Test Engineers report to supervisors under the Plant Manager and will be responsible for the conduct and direction of tests during the power ascension test phase. Their duties and responsibilities include:

1. Preparation of assigned test procedures to direct and guide specific tests in accordance with a standard format;

2. Performance of power ascension tests;

3. Direction to support personnel and others during performance of tests including appropriate interface with plant operators;

4. Ensuring the safety of personnel and plant equipment during testing;

5. Familiarization of support personnel with specific tests;

6. Identification of deficiencies that could adversely affect test performance;

7. Assembly of test data and preparation of test reports for evaluation by others; and,

8. Authority to disallow or terminate testing due to conditions which could endanger personnel or equipment.

14.2.2.2.3 Operations

The Operations Manager will be responsible for the proper operation of all equipment and for ensuring that the conduct of the test program does not place the plant in an unsafe condition. He will provide personnel from the operating staff as required to support the conduct of testing activities.

The Shift Operations Supervisors report to the Operations Manager (via the Operations Superintendent) and are responsible for the safe operation of the plant during assigned shifts. They also are responsible for the implementation of appropriate clearance tagging procedures and have authority to disallow or terminate testing due to conditions which could endanger personnel or equipment.

14.2.2.2.4 Maintenance

The Maintenance Manager will be responsible for performing preventive and corrective maintenance when required on components and systems that are under the jurisdictional control of Startup and Test. He will provide personnel from the maintenance department to support testing activities as required.

14.2.2.3 Nuclear Quality Assurance

A system of planned and periodic management audits will be conducted by Nuclear Quality Assurance (NQA).

14.2.2.4 Major Participating Organizations

14.2.2.4.1 Nuclear Engineering

WBN Site Nuclear Engineering (NE) will be responsible for assisting, to the extent required, in ensuring that tests sufficiently verify the adequacy of system design. This responsibility includes:

1. Development of test scoping documents;

2. Review of preoperational test procedures (as member of Joint Test Group (JTG)) and power ascension test procedures (as member of Plant Operations Review Committee (PORC)) to assure test objectives and acceptance criteria comply with design, license commitments, and consistency with the plant safety analyses;

3. Providing all design information necessary to ensure that detailed test procedures correspond to WBN systems; and,

4. Review and approval of completed preoperational test results (as member of JTG) and selected power ascension tests (as member of PORC).

14.2.2.4.2 Construction

The Modifications Manager is responsible for construction completion, performance of associated construction tests, and orderly completion of components and systems consistent with the test program schedules. This responsibility includes:

1. Completion of construction and construction testing activities; and,

2. Providing craft technical manpower support as required for performance of the test program.

14.2.2.4.3 Westinghouse Electric Corporation

Westinghouse, as the Nuclear Steam Supply System (NSSS) supplier, is responsible for providing technical direction to TVA-WBN during preoperational and power ascension testing. Technical direction is defined as technical guidance, advice, and counsel based on current engineering, installation, and testing practices. This responsibility includes:

1. Assignment of qualified personnel to provide advice and assistance to WBN for testing and operation of all equipment and systems in the Westinghouse area of responsibility as required;

2. Assignment of an operational physicist to the site organization during fuel loading and low power testing; and

3. Providing test guidelines for preoperational tests of Westinghouse furnished components and systems, and for the power ascension test program.

14.2.2.5 Joint Test Group

The Joint Test Group (JTG), functioning as an advisory group to the Startup Manager, is responsible for reviewing assigned preoperational testing activities and advising the Startup Manager on the disposition of those items reviewed. The primary function of the JTG is the review and approval of startup administrative procedures, preoperational test procedures, test procedure revisions, and test results. The Chairman of the JTG will report to the Startup Manager.

14.2.2.5.1 JTG Membership

As a minimum, the JTG will be composed of one representative from each of the organizations listed below. Representatives of other organizations will participate as requested by the JTG Chairman.

Startup and Test
Plant Operations
Technical Support
Site Nuclear Engineering
Quality Assurance
Westinghouse (for all matters concerning preoperational testing performed on the NSSS and associated auxiliary systems)

JTG members and their alternates, including the Chairman, will be designated in writing with the concurrence of the Site Vice President.

14.2.2.6 Plant Operations Review Committee

The Plant Operations Review Committee (PORC) is comprised of certain plant supervisory and technical personnel. PORC is charged with reviewing power ascension testing activities and advising the Plant Manager on the disposition of those items reviewed. The responsibilities of PORC with respect to initial power ascension testing activities include the review and approval of all initial power ascension test procedures, revisions, and test results by appropriate members. PORC membership is described in Section 13.4.1.

14.2.2.7 Personnel Qualifications

The minimum qualifications of individuals that direct or supervise the conduct of preoperational tests at the time of performance of their duties, shall be: (1) Bachelor's degree in engineering or the physical sciences and one year of experience in power plant testing or operation of similar nuclear power plant components/systems, or (2) a high school diploma or equivalent and six years of experience in power plant testing or operation of similar nuclear power plant components/systems. In case (2), credit for up to two years for related technical training may be substituted for experience on a one-for-one basis.

The minimum qualifications of individuals that direct or supervise the conduct of power ascension tests at the time of performance of their duties shall be: (1) Bachelor's degree in engineering or the physical sciences and two years of experience in power plant testing or operation. Included in the two years shall be a minimum of one year of nuclear power plant testing, operating or training on a nuclear facility, or (2) a high school diploma or equivalent and five years of experience in power plant testing of which two years will be nuclear power plant experience. In case (2), credit for up to two years for related technical training may be substituted for experience on a one-for-one basis.

The minimum qualifications of individuals responsible for review and approval of preoperational test procedures and results shall be; (1) Bachelor's degree in engineering or the physical sciences and four years of applicable power plant experience; or (2) high school diploma or equivalent and eight years of applicable power plant experience. In case (2), credit for up to two years for related technical training may be substituted for experience on a one-for-one basis. A minimum of two years shall be applicable nuclear power plant experience.

The minimum qualifications of individuals responsible for review and approval of initial power ascension test procedures and results shall be the same as required for regular members of the Plant Operations Review Committee as described in Section 13.4.1, PORC Membership Qualifications.

14.2.3 Test Procedures

14.2.3.1 General

Tests will be performed in accordance with approved procedures. The following sections describe the general methods employed to control procedure development and review, and describes the responsibilities of the various organizational units participating in this process.

The detailed controls and methods will be prescribed in the startup administrative procedures for component, acceptance, and preoperational testing and plant administrative procedures for power ascension testing, as applicable.

14.2.3.2 Development of Procedures

Technical information required for the preparation of test procedures will be provided by the appropriate engineering organizations. Sources for this information are test scoping documents, system descriptions, technical specifications, design drawings, and other technical documents which define the functional requirements and performance objectives for the various systems and components. Additional technical data may also be obtained from the various component vendors and other contractors as required.

The applicable functional requirements provided by the system designers will be incorporated into the acceptance criteria for each test procedure. This information will also be used by the test engineer in developing the detailed test methods which ensure that the capability of systems and components to function properly within design specifications is adequately demonstrated.

14.2.3.3 Review and Approval of Test Procedures

An independent technical review of component and acceptance test procedures by qualified personnel will be performed prior to approval by the Startup Manager. The Startup Manager may request additional reviews as he deems appropriate.

Preoperational test procedures will be reviewed by personnel who are assigned to JTG member organizations and qualified for review of preoperational test procedures as described by Section 14.2.2.7. The Startup Manager may request additional review to be performed as he deems appropriate. Preoperational test procedures will be approved by the Startup Manager after recommendation for approval by the JTG.

Power ascension test procedures will be forwarded to the appropriate members of the Plant Operations Review Committee for review and comment. Final approval of power ascension test procedures is the responsibility of the Plant Manager.

14.2.3.4 Format of Test Procedures

Test procedures will be prepared based on formats specified by administrative procedures. These standard formats will help ensure that each procedure contains the information and instructions required to satisfactorily perform and document the test. The procedures format and content will reflect the guidance provided in Regulatory Guide 1.68. The standard format will include, as a minimum, the following:

1. Test Objectives:

   A detailed statement of the test objectives and method of system or plant operation to be demonstrated.

2. References:

   References to technical specifications, supporting procedures, vendor manuals, or other technical documents will be included as required.

3. Precautions and Limitations:

   Precautions and limitations relating to personnel safety, equipment integrity, and overall plant safety will be specified.

4. Prerequisites:

   Prerequisites and initial conditions, including special environmental conditions, are specified and the necessary component tests and construction activities have been verified to be satisfactorily completed.

5. Acceptance Criteria:

   The performance objectives and functional requirements for system operations will be specified. The criteria used to judge the success or failure of the test shall be qualitative or quantitative.

6. Instructions:

   The instruction section will contain detailed step-by-step instructions for operating the system in the test configuration, performing actual test manipulations, and for use of off-normal procedures such as jumper cables or mechanical bypasses and restoration of the system to normal status following test. The detailed test instructions will utilize normal and emergency plant operating procedures to the extent practical.

7. Data Collection/Test Results:

   Provisions will be made for recording all pertinent test data regarding system conditions and performance. Records will identify the observer, type of test instrumentation used, acceptability of results, and any deficiencies, and will become a part of the permanent plant records.

14.2.3.5 Test Procedure Revisions/Changes

Revisions to preoperational and power ascension test procedures will be reviewed and approved in accordance with Section 14.2.3.3 prior to use.

Changes to preoperational and power ascension test procedures required during test performance will be classified as intent or non-intent changes. Intent changes are changes to test methods, objectives, or acceptance criteria that affect Initial Test Program commitments as described in the FSAR. Non-intent changes are changes of any other type.

Preoperational and power ascension test procedure changes required during test performance will be approved prior to implementation of the change, as follows:

1. Preoperational Test Procedures

   a. Changes to test procedures that change the intent of the test will be reviewed and approved in the same manner as the original test procedure, as described in Section 14.2.3.3.

   b. Changes to test procedures that do not change the intent of the test will be approved by the assigned test engineer and another individual qualified, as described in Section 14.2.2.7, for review and approval of the test procedure.

   c. All procedure changes will be included with the completed procedure and be subject to review with the test results as described in Section 14.2.5.

2. Power Ascension Test Procedures

   a. Changes to initial power ascension tests that do not change the intent of the test will have the Shift Supervisor's concurrence and approval of the person in charge of the test.

   b. Changes to initial power ascension tests that change the intent of the test will be reviewed and approved in the same manner as the original test.

14.2.4 Conduct of Test Program

14.2.4.1 Administrative Procedures

Conduct of the test program will be controlled by administrative procedures. These procedures will provide detailed instructions to assure adequate control of activities such as the following:

1. Preparation, review, and approval of test procedures

2. Release of systems

3. Format and content of test procedures

4. Temporary system modifications

5. Test deficiency processing

14.2.4.2 Component Testing

Upon completion of construction phase activities, the Startup and Test organization will conduct appropriate component tests and acceptance or preoperational tests. During the system completion phase, systems and components will be reviewed for completeness, installation damage, and conformance with appropriate installation and/or design documents. Outstanding construction and test deficiencies will be identified and controlled. Component test instructions will be issued to assure that applicable prerequisites are met before testing is initiated and provide guidance on proper test performance and documentation of results. Appropriate component tests will be performed prior to the performance of preoperational or acceptance tests.

14.2.4.3 Preoperational and Acceptance Testing

Technical direction and administration, including test procedure preparation, test execution, and data recording of preoperational testing is the responsibility of the Startup Manager. The plant staff retains the responsibility for performing actual equipment operations and maintenance. The test engineers direct support personnel in the performance of tests and provide appropriate interface with plant operators. The Shift Operations Supervisors will be responsible for ensuring that the conduct of testing does not place the plant in an unsafe condition at any time. Additionally, the Shift Operations Supervisors and test engineers have the authority to terminate or disallow testing at any time.

14.2.4.4 Power Ascension Testing

Technical direction and administration, including test procedure preparation, test execution, and data recording of power ascension testing is the responsibility of the Technical Support Manager. The plant staff retains the responsibility for performing actual equipment operations and maintenance.

The Technical Support Manager is responsible for the administration and implementation of all power ascension testing activities.

The test engineers will directly support personnel in the performance of tests and will provide appropriate interface with plant operators. The Shift Operations Supervisors will be responsible for insuring that the conduct of testing does not place the plant in an unsafe condition at any time. Additionally, the Shift Operations Supervisors and test engineers have the authority to terminate or disallow testing at any time.

14.2.4.5 Test Prerequisites

Each test procedure will contain a set of prerequisites or initial conditions as prescribed by administrative procedures. The test engineer will ensure that all specified prerequisites are met prior to performing the test. The format for test procedures is described in Section 14.2.3.4.

14.2.4.6 Phase Evaluation

Following each major phase of the initial test program, test results and/or test status will be reviewed to ensure that all required tests have been performed and the test results are satisfactory. This review will ensure that all required systems have been tested satisfactorily and that test results are

approved before proceeding to the next stage of testing. This review is described in Section 14.2.5.

14.2.4.7 Design Modifications

Modifications to the design of equipment during the test program may be initiated in order to correct deficiencies discovered as a result of testing. Any such modification will be referred to the appropriate engineering organization for approval.

Modifications made to components or systems after completion of preoperational or initial power ascension testing will be reviewed for retesting requirements on affected portions of the system.

14.2.5 Review, Evaluation, and Approval of Test Results

Following completion of a particular test, the responsible test engineer will assemble a test data package for evaluation. Acceptance test data packages will be independently reviewed as assigned by the Startup Manager. Preoperational test data packages will be reviewed by appropriate members of the JTG. Power ascension test data packages will be reviewed by appropriate members of the Plant Operations Review Committee.

Each test data package will be reviewed to ensure that the test has been performed in accordance with the approved procedure and that all required data, checks, and signatures have been properly recorded and that system performance meets the approved acceptance criteria.

Deficiencies identified in the review process will be documented and resolved to the satisfaction of the appropriate review group. If the evaluation indicates that deficiencies in the test method are responsible for unsatisfactory test results, the test procedure will be appropriately revised or changed before retesting is initiated. Whenever an evaluation of test results indicates deficiencies in system performance, the problem will be referred to the appropriate engineering organization for evaluation.

The responsibility for final approval of acceptance and preoperational test results rests with the Startup Manager. The responsibility for final approval of power ascension test results and authorization to proceed to higher power levels following completion of major power plateau testing (i.e., 5%, 30%, 50%, and 75%) rests with the Plant Manager.

Following each major phase of the test program, test results and/or test status will be reviewed to ensure all required tests have been performed and acceptance criteria satisfied; all test deficiencies have been properly dispositioned and appropriate retesting completed; and the test results have been reviewed and approved by appropriate designated personnel prior to proceeding to the next major test phase. This review will ensure that all required systems are operating properly and that testing for the next major phase will be conducted in a safe and efficient manner. This type of review will be performed to the extent required before major test phases such as fuel load, initial criticality, and power ascension. During the power ascension phase, review and approval of power ascension test procedure results will be completed for each major power plateau prior to proceeding to the next plateau.

14.2.6 Test Records

Test documentation such as test procedures, test results, test deficiencies and test changes relating to the initial test program will be processed, controlled, and retained as a plant historical record in accordance with requirements of the WBN Quality Assurance program and project implementing procedures. A summary of power ascension testing will be provided in a Power Ascension Test Report in accordance with requirements of the WBN Technical Specifications.

14.2.7 Conformance of Test Programs with Regulatory Guides

The initial test program will be developed and conducted in accordance with the following applicable regulatory guides (RG). In certain cases, exceptions or alternate approaches to regulatory guidance are planned. Justification for these exceptions or alternate approaches are provided with the applicable regulatory guide.

1. RG 1.20, "Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing," Rev 2

   Discussion: WBN reactor internals are not a prototype design. Exception is taken to certain requirements of RG 1.20. Refer to FSAR Sections 3.9.2.3, 3.9.2.4, 3.9.2.5, and 3.9.2.6 for justification of exceptions and alternate plans.

2. RG 1.41, "Preoperational Testing of Redundant On-site Electric Power Systems to Verify Proper Load Group Assignments," Revision 2

   Discussion: The initial test program will comply fully with the requirements of RG 1.41 as discussed in FSAR Section 8.1.5.3.

3. RG 1.52,"Design, Testing, and Maintenance Criteria for Atmospheric Cleanup System Air Filtration and Absorption Units of Light-Water-Cooled Nuclear Power Plants," Revision 2

Discussion: See Tables 6.5-1, 6.5-2, 6.5-3, and 6.5-4 for discussion of compliance with RG 1.52 and associated ANSI standards.

4. RG 1.68,"Initial Test Programs for Water-Cooled Nuclear Power Plants"

Discussion: The initial test program complies with the requirements RG 1.68, Revision 2 (8/78), with the following exceptions and/or alternate approaches:

a. Regulatory Position C.1

(1) Appendix A, subparagraph 1.c

Acceptance criteria for the response time of the various logic channels will be consistent with Technical Specifications requirements. The Reactor Trip System Response Time is defined in the Technical Specifications as the time interval from when the monitored parameter exceeds its trip setpoint at the channel sensor until loss of stationary gripper coil voltage. The accident analysis accounts for conservative values for delay times, setpoint drift, etc. Therefore, it is not necessary to account for the response time of the associated hardware between the measured variable and the input to the sensor in the test or acceptance criteria.

(2) Appendix A, subparagraph 1.g.2

Emergency loads will not be tested with minimum and maximum design voltage available. Emergency loads will be tested to demonstrate satisfactory starting and operating characteristics with power supply voltage within the design operating range. Transformer taps will be adjusted to obtain optimum voltage levels from no-load to full load conditions. Tests will be performed to record operating parameters of the offsite grid, Class 1E 6.9Kv, 480 volt, and 120 volt vital power busses under no-load, steady state load, and transient conditions. Data will be obtained for the Class 1E train having the lowest analyzed voltage. The recorded information will be compared to engineering voltage calculations to validate the analytical models used.

(3) Appendix A, subparagraphs 1.j.22, 1.k.2, and 1.k.3

The subject equipment is calibrated and functionally tested as part of the WBN plant instrument calibration program. The calibration and functional testing is performed and documented in accordance with approved plant calibration procedures. Therefore, additional testing in the form of a preoperational test is not warranted.

(4) Appendix A, subparagraph 1.k.4

Refer to RG 1.52 for discussion of compliance with requirements for filter and in-place leak tests.

(5) Appendix A, subparagraph 4.t

Natural circulation tests of the Reactor Coolant System will not be performed. Such tests have been successfully completed at McGuire Unit 1, Salem 2, Sequoyah 1 and other Westinghouse plants similar to WBN. It is unnecessary for WBN to compare flow (without pumps) and temperature data to data at these plants since no design differences exist which would significantly effect natural circulation capabilities. Typical natural circulation characteristics for 4 loop Westinghouse plants are given in WCAP-8460, "Natural Circulation Test Report for Zion Station Unit 1." However, in order to verify natural circulation cooldown and boron mixing capability per requirements of Branch Technical Position RSB 5-1, WBN has referenced test results from Diablo Canyon Unit 1, and the WBN design is comparable to Diablo Canyon Unit 1.

(6) Appendix A, subparagraph 5.k.k

The most influential contributor for this transient is the value of moderator temperature coefficient of reactivity, which has a relatively low value at beginning of core life. Since this parameter is determined in other startup tests, thus validating the safety analysis, the performance of this test provides no new information needed to verify the plant design. The transient does introduce the potential for thermal stress damage to the steam generator feedwater inlet nozzles and it expends one of the analyzed thermal cycles. Therefore, we do not intend to perform a test to comply with this subparagraph.

(7) Appendix A, subparagraph 5.i

The moveable incore neutron flux detector system is not designed to verify the position of all RCCA's that might be misaligned from their bank.

(8) Appendix A, subparagraph 5.d

WBN plant design does not include part-length control rods. The ability to control core xenon transients is a design feature of the Westinghouse Nuclear Steam Supply System and has been demonstrated in numerous operating pressurized water reactors. In addition, compliance with Technical Specifications for Axial Flux Difference ensures proper power and flux distributions. On these bases, WBN does not intend to perform an Initial Power Ascension Test to comply with subparagraph 5.d.

(9) Appendix A, subparagraph 5.i.i

The performance of this test provides no new information needed to verify the plant performance during design transients. A trip of the reactor coolant pumps results in a reactor trip with flow coastdown, as verified in the Reactor Coolant System Flow Coastdown Test, providing sufficient heat removal to ensure DNBR does not decrease below 1.30. Performing this test expends one of the analyzed transients and results in unnecessary cost and down time for the utility.

(10) Appendix A, subparagraph 5.u

Operability and response times of the main steam isolation valves will be verified in hot standby (mode 3) rather than at the recommended 25% power level. Testing at hot, zero power will result in more conservative results and will eliminate the unnecessary pressure and steam flow transients which would otherwise be induced.

(11) Appendix A, subparagraph 5.m.m

The performance of this test provides no new information needed to verify the plant performance during design transients. Closure of all main steam isolation valves from 100% power causes a turbine trip and a reactor trip. Turbine trip and reactor trip from 100% power will be performed during initial power ascension testing. Closure of the MSIV's may cause operation of the pressurizer and steam generator power operated relief valves and/or safety valves which may then require repair and unnecessary down time for the utility. This test would expend one of the analyzed pressure transients for the reactor coolant system and steam generators and therefore will not be performed.

(12) Appendix A, subparagraph 2.b

Cold no flow, cold full flow and hot no flow rod drops do not provide any additional useful data. The drop times for these flow conditions are less conservative than for hot full flow conditions. We do not intend to perform cold no flow, cold full flow and hot no flow rod drops.

(13) Appendix A, subparagraph 5.h

Rod drop times are measured during precritical testing at hot full-flow conditions. There is no provision in the design to allow for determination of rod scram times following normal plant trips. This test meets the intent of subparagraph 5.h.

(14) Appendix A, subparagraph 5.j

The WBN design does not include partial scram or rod runback features. Therefore, a power ascension test will not be performed to comply with subparagraph 5.j.

(15) Appendix A, subparagraph 4.c and 5.e

No new design information is to be gained from the RCCA Pseudo Ejection Test. WBN is not a prototype plant for 4 loop, 12 feet core with 17 x 17 fuel design and B_4C control rods. Performance and measurement data already exists for this design. Therefore, WBN will not perform this test.

(16) Appendix A, subparagraph 5.a.

Power reactivity coefficients will not be determined at 25%, 50%, 75%, and 100% power levels. The power coefficient is not directly measured but is inferred. The required measurement for the test is time consuming compared with the value of the data obtained. The

measurement has been previously deleted at other plants based on inferred measurements at similar plants. WBN is similar to Sequoyah Units 1 & 2 and McGuire Units 1 & 2. The power coefficient (Doppler coefficient) was inferred and compared with design values in three of these four units. The comparison between the inferred measurements and design values was within acceptance criteria in all cases thus demonstrating the ability to analytically predict this design parameter.

(17) Appendix A, subparagraph 5.f

WBN does not intend to perform a Pseudo dropped rod test. There is no appreciable new data that would be obtained from performing this test. Previous plants have proved the design bases for typical cores.

b. Regulatory Position C-4

Exception is taken to guidance related to providing approved test procedures to NRC staff personnel 60 days prior to their intended use. In lieu of 60 days, approved preoperational test procedures for satisfying FSAR testing commitments will be made available for regional NRC personnel approximately 30 days prior to their intended use. Power ascension tests will be made available to the NRC 60 days prior to fuel load in accordance with Regulatory Position c.4. Safety Evaluation Report (NUREG-0847, Supplement 3), January 1985, accepted a 30 day period for making approved preoperational test procedures available to the NRC.

5. RG 1.68.2, "Initial Startup Test Program to Demonstrate Remote Shutdown Capability for Water Cooled Nuclear Power Plants"

Discussion: The testing activities conducted as a part of the Initial Test Program will comply with the applicable requirements of RG 1.68.2, Revision 1 (7/78).

6. RG 1.79,"Preoperational Testing of Emergency Core Cooling Systems for Pressurized Water Reactors"

Discussion: Preoperational testing of the Emergency Core Cooling Systems will comply fully with RG 1.79, Revision 1, (9/75) with exception to Regulatory Position C.1.b(2) Recirculation Test - Cold Conditions. A satisfactory in-plant test of the containment sump to demonstrate vortex control and acceptable pressure drops across screening and suction lines and valves is not practical. Justification for this exception is provided in FSAR section 6.3.4.1.

7. RG 1.68.3, "Preoperational Testing of Instrument and Control Air Systems"

Discussion: Preoperational testing of the Instrument and Control Air Systems will comply with RG 1.68.3, April 1982, with the following exceptions:

a. Regulatory Position C.8

Auxiliary Control Air System loads will not be tested to verify their response to a sudden loss of system

pressure. NRC concurrence with this exception is reflected in correspondence from R.C. Lewis to H.G. Parris dated February 28, 1984.

b. Regulatory Position C.8

Non-safety related loads will not be tested to verify their response to a loss of system pressure as part of the Auxiliary Control Air System preoperational test. The Auxiliary Control Air System does not supply air to non-safety related loads. However, non-safety related air operated components will be tested on a component basis to verify proper response to a loss of air condition.

c. Regulatory Position C.11

Functional testing to demonstrate operability of compressed air system loads under increased pressure conditions will not be performed. The safety evaluation of the system indicates that the system is adequately designed to prevent system overpressure as described in FSAR Section 9.3.1.3.

8. RG 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants"

Discussion: Preoperational testing of onsite diesel generators designed to provide emergency power to emergency safety features under loss of offsite power conditions will be in accordance with the requirements of RG 1.108, Revision 1 (8/77).

9. RG 1.118, "Periodic Testing of the Electric Power and Protection Systems"

Discussion: Testing of the Reactor Protection System will be in compliance with the requirements of RG 1.118, Revision 2 (6/78).

10. RG 1.140, " Design, Testing, and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants," Revision 1 (1979)

Discussion: Testing of normal (non-safety related) ventilation exhaust filtration systems will be performed in full compliance with guidance provided by this Regulatory Guide.

14.2.8 Utilization of Reactor Operating and Testing Experience in Development of Test Program

The WBN initial test program will utilize information gained from operating and testing experience in other similar nuclear plants. This information will be used to provide guidance in developing test procedures and schedules and to alert personnel to potential problem areas.

TVA has an established Nuclear Experience Review (NER) Program. The NER Program identifies and evaluates experience gained from TVA nuclear plants, Institute of Nuclear Power Operations (INPO), Nuclear Regulatory Commission (NRC), from other nuclear utilities, architect-engineers and contractors, equipment suppliers, and others within the nuclear industry. The program ensures that significant operational experience and events are reviewed and integrated into applicable programs/procedures to enhance nuclear safety and reliability. Items that could impact testing will be reviewed by the appropriate testing organization to determine appropriate actions such as procedure revisions, review of completed test, retest, etc.

Additionally, testing and operating experience gained from Unit 1 will be incorporated into the Unit 2 test program.

14.2.9 Trial use of Plant Operating and Emergency Procedures

To the extent necessary, the plant operating, emergency, surveillance and periodic test procedures will be use-tested during the initial test program and will also be used in the development of preoperational and initial power ascension procedures to the extent practical. The trial use of plant procedures serves to familiarize operating personnel with systems and plant operation during the testing phase and also serves to assure the adequacy of the procedures under actual or simulated operating conditions before plant operation begins.

Prior to fuel load, draft operating procedures may be utilized for equipment operation. The operating procedures will be revised as necessary to reflect experience gained during the actual testing.

During the power ascension test phase, power escalation tests normally performed once each cycle during startup will be performed to demonstrate their adequacy.

14.2.10 Initial Fuel Loading, Criticality, and Power Operation

Fuel loading will begin after review and approval of the results of tests summarized in Table 14.2-1. At the completion of fuel loading, the reactor upper internals and pressure vessel head will be installed and additional mechanical and electrical tests will be performed to prepare the plant for nuclear operation. After final precritical tests, nuclear operation of the reactor will begin. This phase of testing includes initial criticality, low power testing and power level escalation. The purpose of these tests is to establish the operational characteristics of the unit and core, to acquire data for the proper calibration of setpoints, and to ensure that operation is within license requirements.

14.2.10.1 Fuel Loading

Prior to starting actual fuel load operations, the reactor containment structure will be completed and the containment building penetrations will be in the condition required by Technical Specifications. Fuel-handling tools and equipment will have been checked out and dry runs conducted in the use and operation of equipment. Inspections of fuel assemblies, rod cluster control assemblies and the reactor vessel will be satisfactorily completed. The reactor vessel and associated components will be in a state of readiness to receive fuel. Water level will be maintained above the bottom of the nozzles and recirculation maintained to ensure a uniform boron concentration. Boron concentration can be increased with the systems required by Technical Specifications.

The overall process of initial core loading will, in general, be directed from the refuel floor of the containment structure by a licensed Senior Reactor Operator. Standard procedures for the control of personnel and the maintenance of containment security will be established and implemented prior to fuel loading.

The as-loaded core configuration is specified as part of the core design studies conducted well in advance of unit startup and as such is not subject to change at startup. In the event mechanical damage is sustained during core loading operations to a fuel assembly of a type for which no spare is available on site, an alternate core loading scheme whose characteristics closely approximate those of the initially prescribed pattern will be determined by Westinghouse and TVA.

The fuel assemblies with inserted components will be assembled in the reactor vessel and submerged in reactor grade water containing adequate dissolved boric acid to maintain a calculated core effective multiplication factor of 0.95 or lower. The refueling cavity will be dry during initial core loading. Core moderator chemistry conditions (particularly boron concentration) will be prescribed in the core loading instruction document and will be verified periodically by chemical analysis of moderator samples taken prior to and during core loading operations.

Core loading instrumentation consists of two permanently installed source range nuclear channels and two temporary source range channels, plus a third temporary channel which can be used as a spare. The permanent source range channels will be installed and operable in the control room for monitoring by operations personnel. The temporary channels will be monitored in containment. At least one permanent channel will be equipped to provide an audible count rate. Both plant channels will have the capability of displaying the neutron flux level on a strip chart recorder. The temporary channels indicate on rate meters. Minimum count rates of 2 counts per second, attributable to core neutrons, will be required on at least 2 of the 4 (i.e, 2 temporary and 2 permanent source range detectors) available nuclear source range channels at all times following installation of the initial nucleus of 8 fuel assemblies. At least 2 artificial neutron sources will be introduced into the core at specified points to ensure a detector response of at least 2 counts per second attributable to neutrons. A response check of nuclear instruments to a neutron source shall be performed within 8 hours prior to loading of the core, or resumption of loading if delay is for more than 8 hours.

Fuel assemblies, together with insert components will be placed in the reactor vessel one at a time according to a previously established and approved sequence. The core loading fuel handling instructions includes detailed tabular check-sheets which prescribe and verify the successive movements of each fuel assembly and its specified insert from its initial position in the storage racks to its final position in the core. Checks are made of the fuel assembly serial number at successive transfer points to guard against possible inadvertent exchanges or substitutions of fuel assemblies. Fuel assembly status boards are maintained throughout the core loading operation.

An initial nucleus of eight fuel assemblies (with inserted components), one of which contains a neutron source, is the minimum source-fuel nucleus which permits subsequent meaningful inverse count rate monitoring. This initial nucleus is determined by calculation. Calculations indicate that this initial nucleus is markedly subcritical (Keff < 0.95) under the required conditions of loading. Each subsequent fuel assembly addition is accompanied by detailed neutron count rate monitoring to determine that the just loaded fuel assembly

does not excessively increase the count rate and that the extrapolated inverse count rate ratio is not decreasing for unexplained reasons. The results of each loading step will be evaluated before the next prescribed step is started.

Criteria for safe loading require that loading operations stop immediately if:

1. An unanticipated increase in the neutron count rate by a factor of 2 occurs on all responding nuclear channels during any single loading step after the initial nucleus of 8 fuel assemblies is loaded (excluding anticipated change due to detector and/or source movement).

2. The neutron count rate on any individual nuclear channel increases by a factor of 5 during any single loading step after the initial nucleus of 8 fuel assemblies is loaded (excluding anticipated change due to detector and/or source movement).

3. A decrease in boron concentration greater than 20 ppm is determined from two successive samples of reactor coolant until the decrease is explained.

Alarms in the containment and main control room are coupled to the source range channels with a setpoint equal to or less than five times the current count rate. This alarm automatically alerts the loading operation personnel of high count rate and requires an immediate stop of all operations until the situation is evaluated. Normally, the alarm used for this purpose is the containment evacuation alarm. In the event the evacuation alarm is actuated during core loading, the situation will be evaluated before core loading is continued. If necessary, core loading personnel will be evacuated. After it has been determined that no hazards to personnel exist, preselected personnel will be permitted to reenter the containment vessel to evaluate the cause and determine appropriate action.

Core loading instructions will specify the condition of fluid systems to prevent inadvertent dilution of the reactor coolant; specify the movement of fuel to preclude the possibility of mechanical damage; prescribe the conditions under which loading can proceed; designate responsibility and authority and provide for continuous and complete fuel and core component accountability.

14.2.10.2 Postloading Tests

Upon completion of core loading, the reactor upper internals and the pressure vessel head will be installed and additional mechanical and electrical tests will be performed prior to initial criticality. A pressure test is conducted after filling and venting are completed to check the integrity of the vessel head installation.

Mechanical and electrical tests will be performed on the control rod drive mechanisms. These tests will include a complete operational checkout of the mechanisms and calibration of the individual rod position indication.

Tests will be performed on the reactor trip circuits to test manual trip operation. The actual control rod assembly drop times will be measured for each control rod assembly. The Reactor Control and Protection System will be checked with simulated signals to produce a trip signal for the various conditions that require plant trip.

At all times that the control rod drive mechanisms are being tested, the boron concentration in the coolant-moderator will be maintained such that the shutdown margin requirements specified in the Technical Specifications are met. During individual RCCA or RCC bank motion, source range instrumentation is monitored for unexpected changes in core reactivity.

A complete functional electrical and mechanical check will be made of the incore nuclear flux mapping system. After final precritical tests, nuclear operation of the reactor will begin. This final phase of power ascension includes initial criticality, low-power testing, and power level escalation. The purpose of these tests is to establish the operational characteristics of the unit and core, to acquire data for the proper calibration of setpoints, and to ensure the operation is within license requirements. All precritical tests will be performed prior to initial criticality and the results evaluated. Prerequisites for performing a test will be specified in the individual test procedure. The sequence of testing will be established by test schedule such that required prerequisite testing is completed prior to performing subsequent testing. Any special test instruments required will be specified to be installed by the test procedure that specifies the test equipment.

Where these test instruments are not left installed for future use, they will be verified as removed from the systems by the test procedure that required their use.

14.2.10.3 Initial Criticality

Initial criticality will be achieved by a combination of shutdown and control bank withdrawal and reactor coolant system boron concentration reduction.

Inverse count rate ratio monitoring, using data from the normal plant source range instrumentation, will be used as an indication of the proximity and rate of approach to criticality. Inverse count rate ratio data will be plotted as a function of rod bank position during rod motion and as a function of primary water addition during reactor coolant system boron concentration reduction.

Initially, the shutdown and control banks of control rods will be withdrawn incrementally in the normal withdrawal sequence leaving the last withdrawn control bank inserted far enough in the core to provide effective control when criticality is achieved.

The boron concentration in the reactor coolant system will then be reduced by the addition of primary water. Criticality will be achieved during boron dilution, or by subsequent rod withdrawal following boron dilution. The rate of primary water addition, and hence, the rate of approach to criticality may be reduced as the reactor approaches criticality to ensure that effective control is maintained. Throughout this period, samples of the primary coolant are obtained and analyzed for boron concentration.

Written procedures specify the plant conditions, precautions and specific instructions for the approach to criticality.

14.2.10.4 Low Power Testing

Following initial criticality, a program of reactor physics measurements will be undertaken to verify that the basic static and kinetic characteristics of the core are as expected and that the values of the kinetic coefficients assumed in the safeguards analysis are conservative.

Procedures will specify the sequence of tests and measurements to be conducted and the conditions under which each is to be performed in order to ensure both safety of operation and the validity and consistency of the results obtained. If test results deviate significantly from design predictions, if unacceptable behavior is revealed, or if unexplained anomalies develop, the plant will be brought to a safe stable condition and the situation reviewed to determine the course of subsequent plant operation.

These measurements will be made at low power and primarily at or near normal operating temperature and pressure. Measurements will be made in order to verify the calculated values of control rod bank reactivity worths, the isothermal temperature coefficient, differential boron concentration reactivity worth, and critical boron concentrations. In addition, measurements of the relative power distributions will be made, and tests will be conducted on the instrumentation including power and intermediate range nuclear channels.

14.2.10.5 Power Level Escalation

After the operating characteristics of the reactor have been verified by low power testing, a program of power level escalation will bring the unit to its full rated power level in successive stages. The minimum test requirements for each successive stage of power escalation will be specified in the initial power ascension test procedures.

Measurements will be made to determine the relative power distribution in the core as functions of power level and control assembly bank position.

Secondary system heat balance measurements will ensure that the indications of power level are consistent and provide bases for calibration of the power range nuclear channels. The ability of the Reactor Coolant System to respond effectively to signals from primary and secondary instrumentation under a variety of conditions encountered in normal operations will be verified.

At prescribed power levels the dynamic response characteristics of the primary and secondary systems will be evaluated. System response characteristics will be measured for design step load changes, rapid load reduction, and plant trips.

Adequacy of radiation shielding will be verified by gamma and neutron radiation surveys at selected points inside the Containment Building and throughout the station site at various power levels. Periodic sampling will be performed to verify the chemical and radio-chemical analysis of the reactor coolant.

14.2.11 Test Program Schedule

Test sequence schedules for preoperational and power ascension testing are shown in Figures 14.2-1 and 14.2-2 respectively. These schedules show certain milestones at which time tests (or portions of tests) should be completed and the overall time frame in which the tests are expected to be performed. These schedules represent a plan for completion of the initial test program which, from time-to-time, may be altered due to unforeseen circumstances. Detailed schedules for testing will be prepared, reviewed and revised on a continuing basis as plant construction progresses. Plant structures, systems, and components which are relied upon to prevent or mitigate consequences of postulated accidents will be fully tested to the extent practical prior to exceeding the five percent power level. This testing includes an RCS flow measurement using RCS elbow tap differential

pressure measurements and engineering calculations prior to initial criticality. However, those testing activities which cannot reasonably be performed below the five percent power level will be fully tested to the extent practical prior to exceeding the 30 percent power level with the exception of the RCS Calorimetric Flow Measurement test which is performed at the 50 percent power level consistent with Westinghouse scoping documents.

Preoperational testing of the various systems and components, which will continue up to fuel loading, is planned to commence approximately 12 months prior to fuel load. Fuel load, initial criticality, and power ascension tests are scheduled to be accomplished over a period of approximately 5 months.

Certain systems will have part of the preoperational testing performed after fuel load due to system configuration (e.g. control rod drive mechanisms require fuel in the vessel to be fully tested). Such systems will be sufficiently tested prior to fuel load to provide reasonable assurance of successful testing after fuel load.

The development of test procedures will be an ongoing process, which will consist of preparation, review, and revision. Approved preoperational test procedures for satisfying FSAR testing commitments will be made available to NRC regional personnel a minimum of 30 days prior to their intended use. Power ascension test procedures will be made available 60 days prior to fuel load.

Unit 2 of WBN is not scheduled for fuel loading until a year or more after unit 1 fuel loading. The major portion of preoperational testing will, therefore, have been completed on unit 1 before significant testing is begun on unit 2. There will be sufficient personnel to cover any overlap of responsibilities which might occur. Power ascension testing on unit 1 should be completed before fuel loading of unit 2.

14.2.12 Individual Test Descriptions

14.2.12.1 Preoperational Tests

The test summaries for each of the preoperational tests to be performed, along with an index to these summaries, are provided in Table 14.2-1. These summaries describe the various tests which are specified as preoperational tests in Regulatory Guide 1.68. The scope and titles of these summaries may not in all cases correspond directly to the actual test procedures which will be used during the initial test program. Certain test procedures may include more than one test as described in these summaries, and in some cases tests described in one summary may be covered under more than one procedure. The overall scope and content of the tests described in these summaries will be addressed in final procedures.

The preoperational test summaries in Table 14.2-1 include general test methods such as the verification of instrumentation, controls, indications, interlocks, and protective devices. The functionality of such devices will be demonstrated during component testing. The completion of appropriate component tests will be verified prior to performance of preoperational tests as described by general prerequisite number two (2) below. It is not intended to reverify the functionality of all individual devices (e.g., instruments, relays, contacts, etc.) which have been previously verified by component tests. However, the important to safety design features (component response such as open, close, start, stop, etc.) which result from the operation of such devices will be demonstrated by system level preoperational tests.

There will be certain prerequisites which will apply in general to all preoperational tests. These general prerequisites are listed here rather than included in each summary.

General Prerequisites:

1. Construction activities have been completed (or exceptions justified) on the system and on the necessary portions of supporting systems and any deficiencies have been properly dispositioned.

2. Functional operability of individual components or subsystems has been demonstrated for items such as valves, pumps, motors, instrumentation, and controls.

3. Test equipment necessary for test performance is available and calibrated.

4. Electrical power and air supplies are available as required for test performance.

14.2.12.2 Power Ascension Tests

The Power Ascension phase of the initial test program consists of preoperational type tests deferred to the power ascension phase, power ascension tests performed prior to fuel loading, fuel load, precritical tests, initial criticality, low power physics tests (0-5%), and power ascension tests above 5% power. Fuel load and initial criticality procedures and tests are described in Section 14.2.10. Test summaries providing descriptions of all other major power ascension tests are provided in Table 14.2-2 along with an index for these test summaries.

TABLE 14.2-1

PREOPERATIONAL TESTS SUMMARIES

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PREOPERATIONAL TESTS SUMMARIES

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TABLE 14.2-1

ESSENTIAL RAW COOLING WATER SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of each train of the Essential Raw Cooling Water to supply required cooling water flow to assigned loads in all modes of operation.

PREREQUISITES

1. Verify system is configured as needed for unit/plant operation.

2. Intake channel from the river is open to supply water.

3. AC and DC electrical power supplies are available.

4. Control air supply is available.

TEST METHOD

1. Verify manual and automatic operation of ERCW pumps, strainers and valves.

2. Verify proper operation of pressure controllers.

3. Check for proper functioning of instrumentation, alarms, freeze protection, and interlocks.

4. Confirm that the isolation valves will properly respond to an isolation signal.

5. Verify proper system flow balancing and ERCW pump hydraulic performance.

6. Demonstrate manual and automatic operation of traveling screens and screen wash pumps.

7. Verify pump and valve time response meets design requirements.

8. Verify proper assignment of train related equipment and proper operation independent of other trains.

TABLE 14.2-1

ESSENTIAL RAW COOLING WATER SYSTEM
TEST SUMMARY

ACCEPTANCE CRITERIA

1. Essential raw cooling water flow through system loads, where measurable with installed instrumentation, meets the design requirements described in FSAR section 9.2.1 and appropriate design documents.

2. Manual and automatic controls, interlocks, alarms, freeze protection, and instrumentation function in accordance with design documents and as described in FSAR section 9.2.1 and 9.3.8.

3. The hydraulic performance of the essential raw cooling water pumps meets or exceeds design requirements described in FSAR section 9.2.1 and applicable design documents.

4. Manual and automatic controls for the traveling water screens, screen wash pumps, and backwash strainers operate in accordance with FSAR section 9.2.1 and applicable design documents.

5. Train related equipment is assigned to the proper train and operates properly independent of the other trains.

TABLE 14.2-1

PRIMARY MAKEUP WATER SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Primary Makeup Water System to furnish demineralized water for use as reactor coolant.

PREREQUISITES

1. The applicable primary makeup water storage tank has been filled with demineralized water to a level adequate to perform the test.

2. Adequate preparations for receipt/disposal of water at distribution points.

TEST METHOD

1. Verify proper operation of the primary makeup water pumps and confirm their capability to supply reactor makeup water to all distribution points.

2. Demonstrate proper functioning of instrumentation, interlocks, and alarms.

ACCEPTANCE CRITERIA

1. The hydraulic performance of the primary makeup water pumps meets or exceeds performance characteristics described by applicable vendor documents.

2. Primary Makeup Water can be supplied to the locations shown in design drawings.

3. Instrumentation, controls, annunciators and interlocks function properly in response to simulated or normal input signals in accordance with design documents.

TABLE 14.2-1

COMPONENT COOLING WATER SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of each train of the Component Cooling Water System to supply required cooling water flows to its associated safety-related loads for the subsystem associated with unit being tested. To demonstrate the capability of the system to respond and realign to the safety-related configuration.

PREREQUISITES

1. Essential Raw Water System is operational.

2. An acceptable water supply is available to component cooling water surge tanks.

3. Control air is available.

4. AC and DC electrical power supplies are available.

5. The system is filled and vented to support performance of the test.

6. System loads are available to receive flow.

TEST METHOD

1. Demonstrate all manual modes of operation including pump/loop combinations.

2. Verify automatic starting of the redundant CCS pump upon loss of CCS discharge pressure.

3. Demonstrate automatic isolation of the non-safety related loop from the rest of the subsystem, and isolation between the two safety-related loops.

4. Verify instrumentation, controls, alarms and interlocks operate per design.

5. Verify proper system flow balancing of the safety and non-safety-related loops and CCS pump Hydraulic Performance.

6. Verify proper assignment of train related equipment and proper operation independent of other trains.

TABLE 14.2-1

COMPONENT COOLING WATER SYSTEM
TEST SUMMARY

ACCEPTANCE CRITERIA

1. The hydraulic performance of the component cooling water pumps meets or exceeds design requirements described in FSAR section 9.2.2 and applicable design documents.

2. Cooling water flow distribution to the non-safety related and safety related loads (normal alignment) is in accordance with design as described in FSAR section 9.2.2 and design documents.

3. Cooling water flow to safety related loads when non-safety related loads are isolated is in accordance with design as described in FSAR section 9.2.2 and design documents.

4. The seal leakage return pumps alternately operate to return seal leakage, collected in the seal leakage collection tank, to the surge tank.

5. The hydraulic performance of the thermal barrier booster pumps meets or exceeds design requirements described in FSAR section 9.2.2 and applicable design documents.

6. Manual and automatic controls including system isolation features, interlocks, alarms, and instrumentation function as described in FSAR section 9.2.2 and in accordance with design documents.

7. Isolation valve closure times meet or exceed design and Technical Specification requirements.

8. Train related equipment is assigned to the proper train and operates independent of the other train.

TABLE 14.2-1

PROCESS SAMPLING SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Process Sampling System to provide liquid and gas samples through the correct flow path from all sample points in the primary and secondary systems, and to determine sample line holdup times.

PREREQUISITES

1. Plant conditions are established as necessary to facilitate drawing of liquid and gas samples from the required sampling locations.

2. Necessary tanks and sampling devices are available for receiving sample effluent and relief valve discharge.

3. Cooling water is available to sample coolers as required.

4. AC and DC electrical power supplies are available.

5. Required instruments and analyzers are calibrated.

6. Sample hood ventilation systems are operational.

TEST METHOD

1. Demonstrate proper system operation with regard to flow paths, flow capacity, and mechanical operability.

2. Verify the operability of the sample coolers and pressure reducing and regulating equipment.

3. Verify operation of instrumentation, detectors, interlocks, and alarms.

4. Demonstrate by flow rate vs line length that the sample line holdup time is within allowable limits.

5. Demonstrate adequacy of sampling procedures.

6. Establish required purge times.

7. Demonstrate isolation valves operate properly on receipt of isolation signal.

TABLE 14.2-1

PROCESS SAMPLING SYSTEM
TEST SUMMARY

ACCEPTANCE CRITERIA

1. Instrumentation and controls including automatic isolation valves, interlocks, and alarms operate properly in response to simulated or normal operating inputs as described in FSAR section 9.3.2 and applicable design documents.

2. Sample line delay times are in accordance with FSAR section 9.3.2.3.

3. Samples can be satisfactorily collected from designated sample points described in FSAR section 9.3.2.2 and analyzed using normal plant sampling procedures.

4. Sample analyzers, sample selection valves, coolers and pressure regulating devices operate in accordance with FSAR section 9.3.2.

TABLE 14.2-1

POST ACCIDENT SAMPLING SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate that samples required under post accident conditions can be obtained, properly handled and analyzed in a safe and timely manner.

PREREQUISITES

1. Supporting systems are operational as required.

TEST METHOD

1. Demonstrate the ability to obtain samples from the reactor coolant system, containment sump and containment atmosphere and transport of the samples to a transfer station or onsite laboratory.

2. Demonstrate that waste liquids go back to containment or to the radwaste system and that gas sample can be disposed of properly.

3. Verify liquid sample panel and containment air sample panel (CASP) carts/casks are operational.

ACCEPTANCE CRITERIA

1. Samples can be obtained from all sample locations and safely transported for onsite analysis or to a transfer point for offsite analysis and analyzed within the required timespan as described by FSAR section 9.3.2.6.

TABLE 14.2-1

LIQUID WASTE DRAINS, COLLECTION AND TRANSFER FACILITIES TEST SUMMARY

OBJECTIVE

Demonstrate the capability of the floor and equipment drains to direct drainage from areas housing safety related equipment, radioactive and potentially radioactive liquids, chemicals and oils to designated collection points for transfer to storage tanks or processing systems.

PREREQUISITES

1. Floor and equipment drain lines and sumps have been cleaned of construction debris and are capable of receiving and transferring liquids.

2. Drain collector tanks and associated transfer pumps are operable.

3. AC and DC electrical power supplies are available.

TEST METHOD

1. Deliver water to each floor and equipment drain and verify capability of the drains to remove the water.

2. Verify setpoints for sump levels and pump actuation.

3. Verify flood detection instrumentation and alarm actuation.

4. Verify ECCS room passive sump and alarm actuation.

ACCEPTANCE CRITERIA

1. All floor and equipment drains are clear of obstruction and direct waste liquids to the proper location.

2. RHR and Containment Spray Pump compartment drains transfer liquid waste at design flowrates as described in FSAR section 9.3.3.

3. Automatic controls, interlocks and alarms operate in accordance with design drawings.

4. Sump and/or drain pumps operate in accordance with design drawings to control sump or tank level as described in FSAR section 9.3.3.

5. Flood detection instrumentation and alarm operates as described in FSAR section 6.3.2.11.3.

TABLE 14.2-1

FIRE PROTECTION SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the operability of the Fire Protection System, including its fire detection and fire suppression functions in accordance with design requirements.

PREREQUISITES

1. The Fire Protection System pumps, piping, controls and associated valves and dampers are operational.

2. Fire Protection and detection instrumentation is calibrated.

TEST METHOD

1. Verify the proper functioning of the fire detection devices to activate the automatic fire protection system, alert the appropriate control location, initiate fire alarms, and to activate automatic closure of fire dampers, as required.

2. Verify proper operation of the fire suppression system, and obtain flow rates through the underground loop and differential pressure across the strainers.

3. Demonstrate the automatic start feature of the Fire Protection System pumps.

4. Demonstrate the capability of the Fire Protection System and Pumps to supply water to required areas of the plant at design flow and pressure.

5. Verify system vibrations are within design limits.

6. Perform a pressurization test on each enclosure that utilizes a CO_2 fire suppression system. Measure the air leakage to determine the CO_2 retention time for each supplied enclosure.

7. Demonstrate proper operation of system instrumentation, alarms, controls and interlocks.

8. Verify the Aqueous Film Forming Foam system proportioning equipment operates in accordance with design and vendor documents.

TABLE 14.2-1

FIRE PROTECTION SYSTEM
TEST SUMMARY

ACCEPTANCE CRITERIA

1. The hydraulic performance of the High Pressure fire protection pumps meets or exceeds design requirements as described in FSAR section 9.5.1.

2. The automatic fire detection system provides indication, annunciation and suppression system actuation outputs in accordance with design documents as described in FSAR section 9.5.1.

3. The Fire Protection System automatic and manual controls, interlocks, alarms, and instrumentation operate properly and in accordance with design drawings.

4. Carbon dioxide and Aqueous Film Forming Foam (AFFF) suppression systems operate properly and in accordance with vendor documents as described in FSAR section 9.5.1.

TABLE 14.2-1

SPENT FUEL POOL COOLING SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Spent Fuel Pool Cooling System to provide required cooling water flows to the spent fuel pool and verify proper operation of the purification loops and skimmers.

PREREQUISITES

1. The Spent Fuel Pool System is filled with demineralized or borated water as required for portions of the test.

2. Spent fuel pool cooling and skimmer system filters and strainers are installed and demineralizer has been loaded as required for portions of the test.

3. Refueling water purification filters are installed as required for portions of the test.

TEST METHOD

1. Verify proper operation and actuation of pumps and valves in all operational modes and verify correct flows in the spent fuel pool cooling loops including:

   - the ability to fill and empty the spent fuel pit (SFP), transfer canal, full cask area, and refueling cavity.
   - the recirculation capabilities using the refueling water purification pumps.

2. Verify correct cooling water flows to the heat exchangers.

3. Verify proper operation and actuation of pumps and valves in the spent fuel pool cleanup loop, and verify flow through the filters and demineralizers.

4. Verify proper actuation and operation of the pump and skimmers in the spent fuel pool skimmer loop and verify correct flows in the loop.

5. Check operation of instrumentation, interlocks, and alarms.

6. Verify no vortexing occurs during various modes of operation.

7. Check the leaktightness of all spent fuel pool and refueling canal gates and isolation devices.

8. Install prefabricated spool pieces as required for flood mode operation.

TABLE 14.2-1

SPENT FUEL POOL COOLING SYSTEM
TEST SUMMARY

ACCEPTANCE CRITERIA

1. The hydraulic performance of the spent fuel pool cooling pumps meets or exceeds the design requirements as described in FSAR section 9.1.3.

2. Vortexing in the spent fuel pool is not observed during normal system operation.

3. The spent fuel pool skimmer pumps and recirculation loops operate in accordance with design requirements as described in FSAR section 9.1.3.

4. The spent fuel pool and refueling canal sectionalizing gates leakage do not exceed design limits and the refueling canals can be de-watered with the spent fuel pool filled.

5. Automatic and manual controls, interlocks, and alarms operate in accordance with design documents.

6. All system flood mode preparations can be made in accordance with design requirements as described in FSAR section 2.4.14.

TABLE 14.2-1

RESIDUAL HEAT REMOVAL SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the operability of the Residual Heat Removal (RHR) System and its capability to provide recirculation flows required to remove heat from the Reactor Coolant System (RCS).

PREREQUISITES

1. The RCS is filled with water for portions of the test, as required.

2. The RWST is filled with water as required to perform tests.

3. Hot functional testing is in progress or the RCS is hot as required to demonstrate RHR cooldown capability.

TEST METHOD

1. Verify the logic, controls, and interlocks associated with the valves in the RHR system.

2. Demonstrate acceptable pump performance while operating on the miniflow bypass line with the discharge isolation valves closed.

3. Demonstrate recirculation capability within the isolated RHR.

4. Demonstrate RHR operation during heatup with letdown from the RHR system through the chemical and volume control system.

5. Demonstrate RHR operation during plant cooldown following hot functional testing, including mid-loop operation.

6. Verify proper operation of alarms, controls, and interlocks.

NOTE: Safety injection functions of RHR system will be demonstrated during testing of Safety Injection System.

ACCEPTANCE CRITERIA

1. The hydraulic performance of the RHR pumps meets or exceeds design requirements as described in FSAR section 5.5.7.

2. Automatic and manual controls, interlocks, and alarms operate in accordance with design drawings.

3. The RHR system provides low pressure letdown and heat removal for RCS cooldown in accordance with design requirements as described in FSAR section 5.5.7.

TABLE 14.2-1

CHEMICAL AND VOLUME CONTROL SYSTEM TEST SUMMARY

OBJECTIVE

To demonstrate the operability of the Chemical and Volume Control System (CVCS), including the capability to maintain charging and letdown flows, to maintain seal-water injection flow to the reactor coolant pumps, to maintain water chemistry conditions, to provide reactor makeup control, and to adjust reactor coolant boron concentration.

PREREQUISITES

1. Applicable portions of the Reactor Coolant System are capable of operationally interfacing with the Chemical and Volume Control System as required.

2. A cooling water supply is available for the heat exchangers as necessary for test performance.

3. Systems required to supply cover gas to the Volume Control Tank (VCT) are operational, and adequate supplies of gas are available.

TEST METHOD

1. Verify proper functioning of charging and letdown system components, including the hydraulic performance of the charging pumps, and operability of heat exchangers, letdown orifices, and control valves.

2. Demonstrate the capability to maintain seal water flow to the reactor coolant pumps.

3. Verify proper flows and pressure drops for seal injection and reactor coolant filters.

4. Verify proper operation of the volume control tank level and pressure control, including testing of the automatic makeup, dilution, alternate dilute, borate, and manual modes of reactor makeup control and cover gas system.

5. Check proper operation of instrumentation, interlocks, heat tracing, and alarms.

6. Verify proper operation of pumps and valves in the boric acid subsystem.

TABLE 14.2-1

CHEMICAL AND VOLUME CONTROL SYSTEM
TEST SUMMARY

TEST METHOD (continued)

7. Demonstrate the chemical control function of the CVCS by verifying the capability of the system to introduce chemicals into the charging flow for pH and oxygen control, and that the system is capable of maintaining a gas pressure in the volume control tank as required during the applicable modes of operation.

8. Verify proper flows to mixed bed and cation demineralizers, and determine pressure drops and effectiveness of demineralizers and filters.

9. Verify that a solution of boric acid can be mixed, transferred, recirculated and stored.

10 Verify that boric acid can be transferred to other systems as required.

ACCEPTANCE CRITERIA

1. The hydraulic performance of the charging pumps meets or exceeds design requirements as described in FSAR section 9.3.4.

2. Charging and letdown normal and alternate flowpaths including heat exchangers, letdown orifices, and control valves operate in accordance with design requirements as described in FSAR section 9.3.4.

3. Automatic and manual controls including chemical and automatic reactor makeup water control, interlocks, and alarms operate in accordance with design drawings.

4. Boric acid can be batched, stored and transferred in accordance with design requirements as described in FSAR section 9.3.4. Heat tracing functions as described in FSAR 9.3.8.

TABLE 14.2-1

FLOOD MODE BORATION
TEST SUMMARY

OBJECTIVE

To demonstrate that the Auxiliary Charging equipment is capable of supplying makeup water flow to the Reactor Coolant System as required during flood mode operations.

PREREQUISITES

1. All necessary support systems are operational as required.

2. All equipment required for flood mode preparation is available.

3. Auxiliary Charging filters are installed and demineralizer loaded.

TEST METHOD

1. Verify proper operation of instrumentation, alarms and interlocks.

2. Demonstrate the equipment's ability to provide required flow to the Reactor Coolant System from the various makeup water sources.

3. Install all equipment required for flood mode operation.

4. Transfer makeup water from the preferred sources to the auxiliary makeup tank.

5. Connect fire hose between the High Pressure Fire Protection System and the auxiliary makeup tank. (Fire water is not to be introduced into the tank).

6. Verify proper operation of the auxiliary boration tank mixer.

ACCEPTANCE CRITERIA

1. The hydraulic performance of the auxiliary charging pumps and booster pumps meets or exceeds design requirements as described in FSAR section 9.3.6.

2. Equipment required for flood mode operation can be properly installed.

3. All automatic controls, interlocks and alarms function in accordance with design drawings.

TABLE 14.2-1

BORON RECYCLE SYSTEM
TEST SUMMARY

OBJECTIVE

Demonstrate the operability of the Boron Recycle System.

PREREQUISITES

1. The recycle evaporator of the Boron Recycle System, and other interrelated or supporting equipment, are operational as required (Unit 2).

2. A steam supply and cooling water supply are available for the evaporator packages as required (Unit 2).

TEST METHOD

1. Demonstrate the capability of the Boron Recycle System to collect water from its various designated sources (Unit 1 and 2).

2. Verify proper operation of system components, including the evaporator package and the feed, distillate and concentrates pumps (Unit 1 and 2 as appropriate).

3. Verify the proper operation of the piping heat tracing (Unit 2).

4. Check for operability of alarms and interlocks (Unit 1 and 2 as appropriate).

ACCEPTANCE CRITERIA

1. The Boron Recycle System components function in accordance with design and vendor documents as described in FSAR 9.3.7 (Unit 1 and 2 as appropriate).

2. Flow paths are verified operational (Unit 1 and 2).

3. Heat tracing and other system related heating methods maintain system minimum temperatures in accordance with design documents (Unit 2).

4. Automatic controls, interlocks, and alarms operate properly in accordance with design drawings and vendor documents (Unit 1 and 2 as appropriate).

TABLE 14.2-1

SAFETY INJECTION SYSTEM
TEST SUMMARY

OBJECTIVE

Demonstrate the ability of the centrifugal charging pumps, the safety injection pumps and Residual Heat Removal pumps to deliver required flows to the RCS during injection phase and recirculation modes of operation.

Verify the discharge characteristics and proper system actuation for each of the SI accumulators.

Adjust flow to all SI branch lines for even flow distribution and total flow rate to prevent charging and safety injection pumps from exceeding runout conditions.

PREREQUISITES

1. The RCS is drained down and the reactor head and internals are removed as required for portions of system tests.

2. The RCS is at nominal operating pressure and temperature for the check valve operability portion of system tests.

3. A supply of nitrogen or compressed air is available for pressurizing the accumulators.

4. Demineralized water or borated water is available to fill the accumulators.

5. The Refueling Water Storage Tank (RWST) is filled with demineralized water or borated water at refueling concentration.

TEST METHOD

Injection Mode

1. Verify that all valves and components required for SIS operation are sequenced properly and are actuated within minimum required times.

2. With the RHR, centrifugal charging and safety injection pumps aligned to take suction from the RWST, sufficient data will be taken to ensure satisfactory operation in the miniflow mode.

TABLE 14.2-1

SAFETY INJECTION SYSTEM
TEST SUMMARY

TEST METHOD (continued)

3. With the reactor vessel head and internals removed, and the pumps taking suction from the RWST, perform full flow tests for each pump. Measure flow and discharge pressure and adjust system as necessary to ensure pumps do not exceed their maximum runout conditions. Measure flows in branch lines and adjust as necessary to ensure that flow distributions for all injection lines are within limits.

4. Align RHR and safety injection pumps to deliver to RCS hot legs. Measure and adjust flows as applicable.

5. Verify proper operation of controls, interlocks and alarms.

6. Verify the primary safety injection to reactor coolant loop check valves will open with the RCS at nominal operating pressure and temperature.

Accumulators

1. Each accumulator is partially pressurized and its discharge valve is then opened allowing discharge to the RCS. Level and pressure measurements are used to calculate line resistance.

2. Verify ability of the accumulator isolation valves to open automatically on a safety injection signal against a differential pressure equal to the accumulator at maximum operating pressure and the Reactor Coolant System depressurized.

3. Verify that the check valves in the accumulator discharge lines will open with the RCS in a hot condition.

4. Verify proper operation of controls, interlocks and alarms.

5. Verify operability of nitrogen fill, venting and relief valves, accumulator drains, and accumulator makeup system.

Recirculation Mode

1. Verify auto operation of RHR pump containment sump suction valves swapover.

TABLE 14.2-1

SAFETY INJECTION SYSTEM
TEST SUMMARY

TEST METHOD (continued)

2. Align safety injection and centrifugal charging pumps to take suction from the discharge of the RHR pumps and deliver to the RCS cold legs with RHR taking suction from the RWST or the Reactor Coolant System hot leg. Measure flows and adjust as necessary to ensure that RHR pumps deliver adequate flow to safety injection and centrifugal charging pump suctions under runout conditions.

3. Verify proper operation of all controls and interlocks, RWST immersion heaters and heat tracing, and alarms.

ACCEPTANCE CRITERIA

1. The hydraulic performance of the safety injection pumps meets or exceeds design requirements as described in FSAR section 6.3.

2. The flow rates and flow distribution for all branch lines are in accordance with design requirements.

3. Accumulator discharge performance is in accordance with design requirements as described in FSAR section 6.3.

4. Automatic and manual controls, interlocks and alarms function properly in response to normal or simulated input signals in accordance with design drawings. RWST temperature maintenance functions as described in FSAR section 9.3.8.

5. Primary SIS to RCS check valves will open with the RCS at nominal operating conditions.

6. The accumulator discharge isolation valves will open properly under maximum differential pressure conditions, RCS depressurized and accumulators at maximum pressure.

TABLE 14.2-1

CONTAINMENT SPRAY SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the hydraulic performance of the containment spray pumps, proper function of the spray nozzles and headers and the proper operation and actuation of the system components.

PREREQUISITES

1. A water supply is available for the containment spray pumps.

2. An air supply is available for testing the Containment Spray and RHR spray nozzles.

3. The Containment Spray pumps discharge lines and the RHR spray lines are isolated to prevent spraying water into the Containment Building.

TEST METHOD

1. Through test connections, pass air under pressure to the containment spray and RHR spray nozzles and ring headers to ensure they are free of obstructions.

2. Operate the Containment Spray pumps through the Refueling Water Storage Tank (RWST) recirculation path to verify pump hydraulic performance.

3. Verify proper sequencing of valves and pumps in response to simulated safeguards actuation signals.

ACCEPTANCE CRITERIA

1. The hydraulic performance of the containment spray pumps meets or exceeds design requirements described in FSAR section 6.2.2.

2. Containment and RHR spray headers and nozzles are not obstructed.

3. Manual and automatic controls, interlocks, alarms, and instrumentation function as described in FSAR section 6.2.2 and applicable design documents.

TABLE 14.2-1

INTEGRATED ENGINEERED SAFETY FEATURES ACTUATION SYSTEM TEST SUMMARY

OBJECTIVE

Demonstrate proper automatic actuation, alignment and operation of all ESF components controlled by the Engineered Safety Features Actuation System (ESFAS) with and without offsite power.

PREREQUISITES

1. The Reactor Coolant System (RCS) is cold and drained down and the reactor vessel head and internals are removed.

2. The Refueling Water Storage Tank has an adequate supply of water.

3. The Containment and RHR spray lines to containment are isolated to prevent spraying into the containment building. The containment sump has been isolated to prevent back filling.

4. Actuation circuitry has been tested and is capable of actuating all equipment upon manual ESFAS actuation.

5. All ESF systems and equipment required to actuate on a ESFAS signal are operational and are aligned for normal operation.

TEST METHOD

1. Conduct the ESF test under normal power conditions, one power train at a time (other power train completely deenergized) to demonstrate ESF train independence and redundance.

2. Verify the proper actuation, alignment and operation of all ESF equipment in response to the ESFAS signal.

3. Verify the ESF component position following reset of the ESFAS signal.

4. Verify all train-related ESF equipment operates correctly including emergency diesel start and load sequence, pump start times and valve actuation upon initiation and reset of an ESFAS signal coincident with a simulated station blackout.

TABLE 14.2-1

INTEGRATED ENGINEERED SAFETY FEATURES ACTUATION SYSTEM TEST SUMMARY

ACCEPTANCE CRITERIA

1. The ESF components operate and properly align in response to a ESFAS signal in accordance with design as described in FSAR section 7.3.1.

2. The diesel generators start and sequence loads when offsite power is not available as described in FSAR section 8.3.1.

3. Components actuated by a ESFAS signal remain in the actuated condition after reset of the initiating signal.

4. During single train actuation tests, all components function in accordance with the requirements of FSAR Section 7.3.1 with the opposite train remaining de-energized.

TABLE 14.2-1

LIQUID WASTE PROCESSING SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Liquid Waste Processing System to process liquid waste and transfer these wastes to their respective disposal points.

PREREQUISITES

1. All necessary supporting equipment is operational.

TEST METHOD

1. Demonstrate proper operation of all components in the system, including the waste holdup tanks and system demineralizers.

2. Verify the proper operation of the reactor coolant drain tank and associated equipment.

3. To demonstrate that the system pumps are capable of providing design flow rates.

4. To demonstrate that the system filters, strainers and demineralizers are capable of passing the required flow rate within the design pressure drop.

5. To verify the operability of the system instrumentation, controls, and interlocks including effluent isolation features and applicable alarms and setpoints associated with the liquid waste processing.

ACCEPTANCE CRITERIA

1. The system will process waste liquids from all assigned collection points through system filters and demineralizers to designated discharge and storage locations in accordance with design requirements as described in FSAR section 11.2.

2. Automatic and manual controls, interlocks including process effluent isolation, and alarms operate in accordance with design drawings and vendor documents.

TABLE 14.2-1

SOLID WASTE PROCESSING SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the operability of the solid waste systems to collect and prepare disposable dry active and wet active wastes.

PREREQUISITES

1. All necessary supporting systems are operational.

2. Associated pumps, piping, and controls are operable.

TEST METHOD

1. Demonstrate the ability to receive, hold, and transfer spent resins from their source to the bulk disposal outlet.

2. Verify proper operation of associated instrumentation, interlocks and alarms.

ACCEPTANCE CRITERIA

1. Wet active waste can be collected, transferred, and dewatered for shipment in accordance with design requirements as described in FSAR section 11.5.

2. Dry active wastes can be compacted for shipment in accordance with design requirements as described in FSAR section 11.5.

3. Automatic and manual controls, interlocks, and alarms operate in accordance with design drawings.

TABLE 14.2-1

GASEOUS WASTE PROCESSING SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the gaseous waste portion of the Waste Disposal System (WDS) to collect and store gases from various plant sources and discharge them to the environment in a controlled manner.

PREREQUISITES

1. The gaseous waste components, piping, all valves and instrumentation are available as required.

TEST METHOD

1. Demonstrate proper operation of the system and its components, including filling and isolation of the gas decay tanks, and waste gas compressor performance.

2. Check for proper functioning of controls, interlocks and alarms.

ACCEPTANCE CRITERIA

1. The performance of the waste gas compressors is in accordance with design requirements as described in FSAR section 11.3.

2. Automatic and manual controls, interlocks, and alarms operate in accordance with design drawings.

TABLE 14.2-1

PROCESS AND EFFLUENT RADIATION MONITORING SYSTEM TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Process and Effluent Radiation Monitoring System to continuously monitor radiation levels of plant liquid and gaseous processes and effluent, record radiation levels, and initiate radiation alarm and isolation signals.

PREREQUISITES

1. A remotely operable check source is available for each radiation detector as required.

2. Electrical power is available at each radiation detector, control panel and associated equipment.

3. System leak tightness has been verified as applicable.

4. Calibration of detector instrumentation is complete including alarm setpoints using a radioactive calibration source.

5. Calibration at associated isokinetic sampling systems has been completed.

TEST METHOD

1. Verify operability of heat tracing and sample coolers.

2. Verify proper operation of associated isokinetic sampling systems.

3. Verify operation and response of the process and effluent radiation monitors to the appropriate check sources including local and control room indicating and recording devices as applicable.

4. Verify the applicable alert, high radiation and circuit malfunction annunciators function properly.

5. Verify proper operation of interlock functions and devices.

6. Verify pump or fan operation, flow indication and control and proper valve operation.

TABLE 14.2-1

PROCESS AND EFFLUENT RADIATION MONITORING SYSTEM
TEST SUMMARY

ACCEPTANCE CRITERIA

1. Liquid and gaseous monitors provide high radiation and instrument malfunction alarms and indication in accordance with design requirements as described in FSAR section 11.4.

2. Automatic interlocks operate in accordance with design drawings.

3. Sample flowrates are in accordance with design requirements and vendor documents.

4. Sample and recirculation pumps, indicators, and control valves operate in accordance with design drawings and vendor documents.

TABLE 14.2-1

AREA RADIATION MONITORING SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of area radiation and airborne radioactivity monitors to provide continuous surveillance of radiation levels throughout accessible areas of the plant site, alert personnel of excessive dose rate levels, and provide direct reading indication and/or recording of dose rates at local and/or central (Main Control Room) monitoring locations.

PREREQUISITES

1. Calibration of each monitor including detectors, indicators, recorders, alarm setpoints and indicating lights is complete.

2. A check source is available for each radiation detector as required.

3. Electrical power is available to each radiation detector, control panel and associated equipment.

TEST METHOD

1. Verify operation and response of the area and airborne radiation monitors with the appropriate check source, including local and control room indicating and recording functions.

2. Verify the applicable alert, high radiation level and malfunctions annunciators function properly.

3. Verify the operation of pumps, flow control instrumentation, and control valves for all airborne radioactivity monitors.

ACCEPTANCE CRITERIA

1. Area radiation and fixed airborne radioactivity monitors provide radiation indication and alarms in accordance with design requirements as described in FSAR section 12.3.4.

2. Sample pumps, indicators and control valves operate in accordance with design drawings and vendor documents.

TABLE 14.2-1

CONTROL BUILDING VENTILATION SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Control Building Ventilation and Air Conditioning to maintain controlled atmospheric conditions within the building for equipment and personnel.

PREREQUISITE

1. Cooling water is available.

2. AC and DC electrical power supplies are available.

3. Compressed air is available for system component operation.

4. Building pressure boundary is complete as required to support testing.

TEST METHOD

1. Verify system capability to supply required air volume and air pressure per design.

2. Verify that redundant trains perform in accordance with design.

3. Verify that system instrumentation, interlocks, and alarms function in accordance with design.

4. Verify proper pressure differentials in rooms.

5. Verify the performance of the control room isolation, associated air handling unit operation, and emergency pressuring air fan operation.

6. Verify pressure integrity of system filter units and channeling does not occur.

7. Verify proper operation of emergency filter units in accordance with design requirements.

8. Verify maintenance of positive pressure in MCR with shutdown board room pressurizing supply fan running.

9. Verify proper switching of the redundant battery room exhaust fans upon failure of normally operating fan.

TABLE 14.2-1

CONTROL BUILDING VENTILATION SYSTEM
TEST SUMMARY

ACCEPTANCE CRITERIA

1. Main Control Room HVAC maintains building temperatures, air flow, building differential pressures, and chilled water flow as described in FSAR section 9.4.1.

2. Control Building Emergency Air Cleanup System controls the release of contamination through HEPA filters and carbon absorbers, maintains air flow as described in FSAR section 9.4.1, and meets the requirements of ANSI N510.

3. Control Building Emergency Pressurization System maintains area pressure differentials and air flow requirements as described in FSAR section 9.4.1.

4. Battery Room Ventilation System maintains air flow requirements for proper ventilation of battery room atmosphere as described in FSAR section 9.4.1

5. Miscellaneous Ventilation Systems within the control building will provide ventilation, temperature control, and pressure differentials to dedicated areas as described in FSAR section 9.4.1. and design documents.

6. Manual and automatic controls, including isolation features, valve and damper closure times, interlocks, alarms, and instrumentation function in accordance with design documents.

TABLE 14.2-1

AUXILIARY BUILDING VENTILATION SYSTEM AND PASF - ENVIRONMENTAL CONTROL SYSTEM TEST SUMMARY

OBJECTIVE

To demonstrate the proper operation of the Auxiliary Building HVAC systems and the Post Accident Sampling Facility (PASF) - Environmental Control System (PASFECS) including air handling units, fans, heaters, water chillers, circulating pumps, cooling coils, HEPA/charcoal filters and air flow.

PREREQUISITES

1. AC and DC electrical power supplies are available.

2. Cooling water is available to cooling coils and chillers.

3. Makeup water is available to Chilled Water System compression tank.

4. Pressure boundary seals are complete as required.

TEST METHOD

1. Demonstrate proper operation of the ventilation supply and exhaust fans, water chillers, circulating pumps, refrigerant condensing units, air handling units, HEPA and charcoal filters, and verify adequate air flow to areas served.

2. Demonstrate proper operation of the inlet and exhaust isolation dampers associated with equipment rooms.

3. Demonstrate proper operation of the heating/cooling units in the building equipment rooms.

4. Verify the system's ability to maintain proper building pressure differentials.

5. Verify the Post Accident Sampling Environmental Control System (PASFECS) HEPA and charcoal filter units satisfy air flow and pressure integrity requirements.

6. Ensure proper operation of instrumentation, interlocks, and alarms.

TABLE 14.2-1

AUXILIARY BUILDING VENTILATION SYSTEM AND
PASF - ENVIRONMENTAL CONTROL SYSTEM
TEST SUMMARY

ACCEPTANCE CRITERIA

1. General Ventilation System supply and exhaust systems maintains building temperatures, air flow, building differential pressures, and chilled water flow as described in FSAR section 9.4.3.

2. Fuel Handling Building Exhaust system, in conjunction with Auxiliary Building General Ventilation System, maintains air flow as described in FSAR section 9.4.2.

3. Safety Features Equipment Room Coolers maintain area temperatures and air flow as described in FSAR section 9.4.5.3.

4. Post Accident Sampling Environmental Control System maintains atmospheric conditions to control the release of contamination through HEPA filters and carbon Absorbers. Maintains air flow as described in FSAR section 9.4.9 and meets the requirements of ANSI N510.

5. Shutdown Board Room Air Conditioning System maintains temperature, air flow, chilled water flow, and area pressure differentials as described in FSAR section 9.4.3.2.4.

6. Auxiliary Board Room HVAC Systems maintain temperature, air flow, area pressure differentials, as described in FSAR section 9.4.3.2.5.

7. Shutdown Transformer Room HVAC Systems maintain temperature, and air flow as described in FSAR section 9.4.3.2.6.

8. Manual and automatic controls, interlocks, auto start and isolation features, alarms, function in accordance with design documents.

TABLE 14.2-1

CONTAINMENT VENTILATION SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Containment Ventilation System to provide air recirculation, proper cooling of upper and lower containment spaces, CRDM cooling, reactor vessel cavity and nozzle support cooling, and proper air purging and filtration.

PREREQUISITES

1. Cooling water is available for the air handling units.
2. Control air is available for valve and damper operation.
3. AC and DC electrical power supplies are available.
4. Access hatches, plugs, gates and shields are in their proper positions.

TEST METHOD

1. Verify the CRDM Cooling Units are capable of delivering design air flow.
2. Verify the Containment Purge Supply and Exhaust fans are capable of delivering design air flow capacities and filtration portions of system operate in accordance with design requirements.
3. Verify the Upper Compartment Cooling units deliver design air flow to all upper containment spaces and verify system will maintain upper containment spaces within design temperatures.
4. Verify the LOWER Compartment Cooling units deliver design air flow to all lower containment spaces. Verify system in conjunction with CRDM cooling, will maintain lower containment spaces within design temperatures.
5. Verify return air fans deliver design air flow and ice condenser doors open at design differential pressures.
6. Verify instrument room cooling system and associated chilled water equipment will deliver design air and water flow.
7. Operate all fans, dampers, and flow control equipment to demonstrate proper manual control and automatic response to start, stop and isolation input signals.

TABLE 14.2-1

CONTAINMENT VENTILATION SYSTEM
TEST SUMMARY

ACCEPTANCE CRITERIA

1. CRDM Cooling Units in conjunction with the Lower Compartment cooling units, will maintain design temperatures and airflows in the lower containment areas as described in FSAR section 9.4.7.

2. Containment Purge Supply and Exhaust System maintains containment atmospheric conditions to control release of contamination through HEPA and carbon adsorber beds, supply fresh air, and provides for isolation of airflow paths to primary containment as described in FSAR section 9.4.6. and meets the requirements of ANSI N510.

3. Upper Containment Cooling units will maintain design temperatures and air flows in the upper containment areas as described in FSAR section 9.4.7.

4. Lower Containment Cooling units in conjunction with CRDM Cooling units,will maintain design temperatures and air flows in the lower containment areas as described in FSAR section 9.4.7.

5. Air return fans will recirculate air, including that from the hydrogen collection ductwork system and discharge with sufficient capacity to force the air through the ice condenser bed system. Ice condenser doors open as described in FSAR section 6.7

6. Incore Instrument room cooling units and associated chilled water systems will maintain the Incore Instrument room environment at design temperatures and provide proper containment isolation as described in FSAR section 9.4.7.

7. Manual and automatic controls, including isolation features,interlocks, alarms, and instrumentation function as described in FSAR section 9.4.6 or 9.4.7 as applicable, and in accordance with design documents.

TABLE 14.2-1

COMBUSTIBLE GAS CONTROL SYSTEMS
TEST SUMMARY

OBJECTIVE

To demonstrate the proper operation of the Hydrogen Recombiners, and Hydrogen Mitigation System (HMS) including the heaters, controllers, igniters, fans, and instrumentation.

To demonstrate the ability of the hydrogen sampling system to detect the presence of hydrogen in the primary containment atmosphere and give indication in the control room.

PREREQUISITES

1. Each igniter has been energized for the minimum required duration and allowed to cool prior to test conduct.

2. Containment Ventilation Systems are operational.

TEST METHOD

1. Verify design air flow through hydrogen recombiners and sample tubing.

2. Verify the hydrogen recombiner heatup rate and operating outlet temperature.

3. Verify sample system controls, interlocks, instrumentation, and alarms operation.

4. Demonstrate the hydrogen analyzer is capable of drawing and analyzing a sample and returning it to containment. Verify alarms and instrumentation function properly.

5. Energize each HMS igniter and verify the voltage and surface temperature.

ACCEPTANCE CRITERIA

1. The Hydrogen Recombiners will achieve and maintain operating temperature at design air flow at design power input as described in FSAR section 6.2.5.

2. The hydrogen analyzer system is capable of sampling and analyzing the containment atmosphere in accordance with design requirements as described in FSAR section 6.2.5.

3. All HMS igniters are operational with current and voltage readings comparable to previous test data in accordance with FSAR section 6.2.5.

4. Controls, interlocks, instrumentation, and alarms operate in accordance with FSAR section 6.2.5 and design drawings.

TABLE 14.2-1

SECONDARY CONTAINMENT VENTILATION SYSTEM
TEST SUMMARY

OBJECTIVE

The Secondary Containment System is comprised of the Shield Building of each reactor unit and that portion of the Auxiliary Building which serves as the Auxiliary Building Secondary Containment Enclosure (ABSCE). The Emergency Gas Treatment System (EGTS) is provided for ventilation control and cleanup of the atmosphere inside the annulus between the Shield Building and the Primary Containment Building of each reactor unit. The Auxiliary Building Gas Treatment System (ABGTS) provides a similar contamination control capability in the Auxiliary Building Secondary Containment Enclosure (ABSCE).

To demonstrate the ventilation systems will maintain building conditions that prevent potentially radioactive gases leaking from primary containment or auxiliary building secondary containment enclosure from directly reaching the outside environment.

PREREQUISITES

1. AC and DC electrical power supplies are available.

2. Compressed air is available.

3. Ventilation systems are sufficiently complete to support testing.

4. Building pressure boundary seals are complete.

TEST METHOD

1. Verify capability of the Emergency Gas Treatment System to maintain the correct air pressure at design-flow.

2. Verify that the air cleanup units of the Emergency Gas Treatment System are capable of processing annulus air (filtering, etc.) at design flow.

3. Verify that the HEPA filter units operate per design and that the charcoal filter units operate per design at rated flow.

4. Verify that the Auxiliary Building Gas Treatment System (ABGTS) fans and filter units maintain correct building pressure at design flow.

5. Verify that correct intra-building and inter-building differential pressures are maintained at design flow.

TABLE 14.2-1

SECONDARY CONTAINMENT VENTILATION SYSTEM
TEST SUMMARY

TEST METHOD (continued)

6. Verify that instrumentation, valve, damper and train separation interlocks operate per design.

7. Verify all setpoints, alarms, and indication.

8. Verify HEPA and charcoal filter units satisfy air flow and pressure integrity requirements.

9. Verify that secondary containment isolation occurs within a time period which meets design.

10 Verify that modulation dampers operate properly to maintain building pressure differentials within design limits.

ACCEPTANCE CRITERIA

1. Emergency Gas Treatment System (EGTS) maintains annulus atmospheric conditions to control the release of contamination through HEPA filters and carbon Absorbers. Maintains air flow and pressure differentials within the annulus area as described in FSAR section 6.2.3 and meets the requirements of ANSI N510.

2. Auxiliary Building Gas Treatment System (ABGTS) maintains auxiliary building atmospheric conditions to control the release of contamination through HEPA filters and carbon Absorbers. Maintains air flow and pressure differentials within the auxiliary building as described in FSAR section 6.2.3.1. and meets the requirements of ANSI N510.

3. Manual and automatic controls, including isolation features, valve and damper closure times, interlocks, alarms, and instrumentation function in accordance with design documents.

TABLE 14.2-1

DIESEL GENERATOR BUILDING VENTILATION SYSTEM TEST SUMMARY

OBJECTIVE

To demonstrate that each of the diesel generator compartment ventilation fans and other diesel generator safety-related room fans will provide adequate ventilation for their associated diesel generator compartment and room.

PREREQUISITES

1. AC and DC electrical power supplies are available.
2. Control air is available.

TEST METHOD

1. Verify that the ventilation system exhaust fan starts automatically on receipt of a diesel generator start signal.
2. Verify adequate ventilation during Emergency Diesel Generator operations.
3. Check operation of instrumentation and alarms.
4. Verify that generator and electrical panel ventilation fans operate per design.
5. Verify that electric board room exhaust fans operate per design.
6. Verify that battery hood exhaust fan and its damper operate per design.
7. Verify adequate air flow is supplied to the 480V auxiliary board room of the Additional Diesel Generator Building in accordance with design requirements.

ACCEPTANCE CRITERIA

1. Diesel Generator Building Ventilation System maintains area temperatures and air flows as described in FSAR section 9.4.5.
2. Manual and automatic controls, interlocks, auto start features, alarms, function in accordance with design documents.

TABLE 14.2-1

DIESEL GENERATORS
TEST SUMMARY

OBJECTIVE

To demonstrate the operability and reliability of the diesel generator units (four standby diesels and one additional diesel) and associated auxiliaries including proper starting and load sequencing.

PREREQUISITES

1. DC and AC power is available for controls, alarms, protective relays, air starting solenoid valves and generator field flashing.

2. Compressed air is available for air starting of the diesel generator unit.

3. Fuel and Lubrication Oil Systems are available to support testing.

4. Cooling water is available and operational.

5. Diesel generator building ventilation is operational.

TEST METHOD

1. Verify proper performance of the diesel generator fuel oil storage and transfer system, cooling and heating systems, and the lubricating oil system.

2. Verify all engine alarms and interlocks are functional.

3. Demonstrate the capability of the unit to start manually and automatically as designed and attain the required voltage and frequency within the acceptable time limitation.

4. Demonstrate the diesel generator batteries and battery chargers operate per design.

5. Verify the operation of the starting air compressors and associated components. Demonstrate sufficient starting air capacity by starting a diesel generator 5 times from the associated set of starting air accumulators without recharging the accumulators.

6. Verify the capability of the diesel generator unit to accept the sequenced equipment by utilizing actual plant loads appropriate for existing plant conditions. The loads will be added at the proper sequence and time duration, while maintaining an acceptable voltage and frequency.

TABLE 14.2-1

DIESEL GENERATORS
TEST SUMMARY

TEST METHOD (continued)

7. Demonstrate ability to synchronize each diesel generator unit with the offsite power source while the unit is loaded, transfer the load from the unit to the offsite source, isolate the diesel generator unit and place it in standby status.

8. Perform load rejection tests including loss of the largest single load and complete loss of load and verify proper voltage is maintained and overspeed limits are not exceeded.

9. Prior to Unit 1 fuel load, demonstrate diesel generator unit reliability by performing a minimum of 23 valid tests per diesel generator unit. Valid tests are defined in RG 1.108, Revision 1, Regulatory Position C.2.e. Additional reliability starts will not be performed prior to Unit 2 operation.

10 Demonstrate loading capability for at least 24 hours, of which 22 hours will be a load equivalent to the diesel generator continuous rating and 2 hours will be a load equivalent to the diesel generator 2-hour rating. Calculate fuel consumption.

11 Reperform tests summarized in steps 3 and 6 above immediately after shutdown from the load test in step 10 to demonstrate functional capability at full load temperature conditions.

12 Demonstrate that no common failure modes exist by starting the redundant diesel generators simultaneously.

13 Demonstrate diesel generator capability to supply emergency load is not impaired during performance of periodic tests.

14 Align the additional diesel generator unit (ADGU) with each of the existing diesel generator units and start the unit to demonstrate proper connection of controls and operation of the ADGU and auxiliaries.

ACCEPTANCE CRITERIA

1. Each diesel generator will automatically and manually (local and remote) start and achieve rated speed and voltage within the time required after receiving a signal to start as described in FSAR section 8.3.1.

TABLE 14.2-1

DIESEL GENERATORS
TEST SUMMARY

ACCEPTANCE CRITERIA (continued)

2. Each diesel generator will be successfully started from a ambient standby condition, loaded to a minimum of 50 percent load, and operated for one hour a minimum of 23 consecutive times without failure as defined by RG 1.108, Revision 1, Regulatory Position C.2.e.

3. Both tandem diesel engines start and operate satisfactorily upon receiving simultaneous start signals. The starting air system capacity is sufficient to start the diesel generator 5 times as described in FSAR section 9.5.6.

4. Each diesel generator will start and achieve rated speed and voltage within the required time and accept the sequenced load when restarted from a hot condition.

5. The diesel generators and auxiliaries satisfactorily operate to maintain 110 percent load for a two hour period followed by 100 percent load for a 22 hour period.

6. Each diesel generator unit will accept assigned shutdown loads in the required sequence and maintain speed, voltage and frequency within design limits as described in FSAR section 8.3.1.

7. The ADGU can be aligned and operated in place of either existing DGU as described in FSAR section 8.3.1.

8. Each diesel generator will maintain voltage and speed upon rejection of largest single load and full load as described in FSAR section 8.3.1.

9. All alarms, automatic and manual (local and remote) controls, interlocks, and protective features of the diesel generators and auxiliaries operate in accordance with FSAR sections 8.3.1 and 9.5.6, and applicable design documents.

TABLE 14.2-1

AC POWER DISTRIBUTION SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the two offsite power sources (normal and alternate) to independently provide power to the 6.9 Kv and 480 Volt AC Distribution System. The load carrying capability of system components (transformers, switchgear, breakers, etc.) will be demonstrated by proper normal operation of loads. Other design features including redundance, independence, interlocks, load shedding, and manual and automatic transfers will be demonstrated.

To collect grid, 6900, and 480 volt Class 1E bus operating data under no-load, steady state, and transient conditions for comparison to engineering voltage calculations.

PREREQUISITES

1. The common and unit station service transformers are energized or available for energization as required.

2. The shutdown boards are energized or available for energization as required.

3. Metering and relaying circuits have been calibrated and are operational.

4. DC control power is available as required.

5. The diesel generator sets and supporting auxiliaries are operational as required.

6. Transformer tap settings are in accordance with design requirements.

TEST METHOD

1. Verify that failure/faults in one of the offsite power sources will isolate the affected source but does not lead to the failure/isolation of both sources

2. Confirm that loss of either redundant safety related train will not impair the ability of the remaining system to supply power to the required safety related loads.

3. Verify operation of alarms, tripping devices, and interlocks are in accordance with design drawings.

TABLE 14.2-1

AC POWER DISTRIBUTION SYSTEM
TEST SUMMARY

TEST METHOD (continued)

4. Demonstrate proper operation of remote and local control and indicating devices for shutdown boards and safety related motor control centers.

5 Demonstrate manual and automatic transfer schemes operate in accordance with design drawings.

6. Verify each of the offsite power sources provide the required no-load voltage to assigned 6.9Kv boards and in turn to the 480 V boards.

7. Verify proper load shedding and/or undervoltage protection of all 6.9 Kv shutdown boards and 480 Volt shutdown boards and confirm diesel generator units receive proper start signals.

8. Verify the capability of each common station transformer to carry the load required to supply ESF loads of one unit under loss of coolant accident conditions in addition to power required for shutdown of the non-accident unit.

9. Select the Class 1E train having the lowest analyzed voltage and record grid, 6900 and 480 volt bus parameters at no-load, steady state (minimum 30% of worst case load), and transient conditions. Induce the transient by the non-concurrent start of a Class 1E 6.9kv motor and a non-class 1E 6.9kv motor.

NOTE: Vital 120 volt AC power voltage surveys will be performed in conjunction with this test.

ACCEPTANCE CRITERIA

1. The offsite power system provides two independent sources of power at the required design no-load voltage level to the onsite power system as described in FSAR section 8.2.1.

2. The AC Distribution System provides power at the design voltage level to safety related loads when supplied power from the normal, alternate, or onsite (standby) power supplies as described in FSAR section 8.3.1.

3. Power supply to safety related loads will automatically and manually transfer to the onsite (standby) diesel units from the normal or alternate supply or manually from the diesel generator units back to the normal or alternate supply as described by FSAR section 8.3.1.

TABLE 14.2-1

AC POWER DISTRIBUTION SYSTEM
TEST SUMMARY

ACCEPTANCE CRITERIA (continued)

4. Safety related trains will operate independent of each other.

5. Interlocks, alarms, controls, tripping, and lockout devices function in accordance with design drawings.

6. AC Distribution System components operate in accordance with vendor and design documents and will carry loads approximating normal operating conditions.

7. No-load, steady state, and transient voltages are within 3% of the analyzed values.

TABLE 14.2-1

DC POWER SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Vital 125 Volt DC Power Systems to supply power to assigned loads during normal and loss of AC power conditions.

PREREQUISITES

1. Batteries are in a nominally full charged condition.

2. AC power is available to battery chargers.

3. The applicable battery area ventilation system is operational.

4. Protective devices including ground detection, breakers, system status sensing devices, relays, and meters have been calibrated.

5. DC power distribution equipment including breakers, cables, and panels are energized or are available for energization.

TEST METHOD

1. Measure the battery charger DC output voltage with and without the batteries connected.

2. Fully recharge the vital 125 Vdc batteries from a minimum design charge condition while supplying steady state loads.

3. Vary and record the charger output voltage over the span specified by the vendor for normal and equalizing operation.

4. Perform a discharge test of the vital 125 Vdc batteries in accordance with IEEE 450-1980 as described in FSAR section 8.3.2.1.1.

5. Verify the batteries and chargers will supply DC power to assigned distribution panels.

6. Disconnect the vital 125 Vdc batteries and chargers from each channel loads to verify electrical independence.

7. Connect the fifth vital 125 Vdc battery to each of the vital 125 Vdc channels (I, II, III, IV).

TABLE 14.2-1

DC POWER SYSTEM
TEST SUMMARY

TEST METHOD (continued)

8. Actuate alarms and protective devices with actual or simulated input signals. Observe local and remote voltage, current and status indicators during battery and charger testing. Operate breakers to transfer and/or energize loads.

9. Measure current for selected loads for comparison to design basis load analysis.

ACCEPTANCE CRITERIA

1. Battery charger output voltage is regulated within tolerance of its nominal design output voltage under loaded and no-load conditions.

2. The vital 125 Vdc battery chargers are able to restore the batteries to a fully charged condition from a minimum design discharge condition within the design time limit while also supplying normal steady state loads.

3. Battery charger output voltages are adjustable over the span specified by the vendor for normal and equalizing operation.

4. The vital 125 Vdc batteries will provide power to essential loads for the required time period with the battery chargers out of service without exceeding minimum DC System or individual cell voltage limits as described in FSAR section 8.3.2.1.1.

5. Nominal design DC voltage is supplied to all DC distribution panels.

6. The loss of either redundant vital 125 Vdc channel will not impair the ability of remaining channels to supply power to assigned loads.

7. The fifth vital 125 Vdc battery can be transferred to supply power to each of the vital 125 Vdc channels as described in FSAR section 8.3.2.1.1.

8. Alarms, protective devices, indicators, breakers, and interlocks operate in accordance with vendor and design documents.

TABLE 14.2-1

VITAL 120V AC POWER SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Vital 120V AC Control Power System to provide uninteruptible power to instrumentation and control loads.

To collect Vital 120 volt bus operating data under no-load, steady state, and Auxiliary Power System (APS) transient conditions (PSB-1) for comparison to engineering voltage calculations.

PREREQUISITES

1. 480 VAC and 125 VDC power supplies are available to the inverter units.

2. The common backup source of 120 VAC power is available to the instrument distribution panels.

3. Inverter test load is available.

TEST METHOD

1. Verify that the system inverters maintain output current and voltage within the required limits while under maximum load.

2. Demonstrate the ability of the inverters to automatically switch between the 480V AC and the 125V DC power sources, while delivering the maximum demand load, and maintaining voltage and frequency within specified design limits.

3. Simulate alarm and protective action conditions.

4. Verify operation of the inverter synchronizing and internal clock.

5. Measure current from selected loads. This data will be used in analysis to determine the design basis load.

6. Verify that AC and DC power supplies to the inverters are connected to the proper safety train.

7. Demonstrate the loss of either division (channel) will not cause a loss of the remaining channels.

8. Transfer distribution board power supply from the inverter source to the 120V AC maintenance source and back to the inverter source.

TABLE 14.2-1

VITAL 120V AC POWER SYSTEM
TEST SUMMARY

TEST METHOD (continued)

9. Record 120 volt buss operating parameters during APS degraded voltage and motor starter transients required for comparison to voltage calculations. This data will be collected concurrently with the 6.9kv and 480 volt Class 1E survey.

ACCEPTANCE CRITERIA

1. The inverters provide rated output voltage and current under maximum load conditions when supplied from the normal 480V AC input or 125V DC alternate input power sources as described in FSAR section 8.3.1.

2. The inverters are capable of providing continuous rated output within design limits during transfer from the normal AC to the DC alternate input power source as described in FSAR section 8.3.1.

3. Alarms and protective features function properly in accordance with design and vendor documents.

4. Distribution boards can be energized from the associated inverter or from the 120V AC maintenance source without interrupting service.

5. Each of the four channels are independent from the others as described in FSAR section 8.3.1.

6. 120VAC Vital Power System voltages under no-load, steady state, and APS transient voltages are within design limits.

TABLE 14.2-1

COMPUTER SYSTEM
TEST SUMMARY

OBJECTIVE

The purpose of this test is to verify the P2500 process computer has been internally wired properly and that the internal CPU, I/O and analog converters function properly.

To verify the operation, calibration and accuracy of the instrumentation involved in the measurement, transmittal, conversion, and computer printout of process parameters.

To verify the proper operation of the P2500 computer software.

PREREQUISITES

1. The latest Operating System Software and Data files are loaded and operational.

2. Required process instrumentation has been installed and checked for proper wiring, termination and signal polarity to the computer.

3. The proper signal conditioners have been installed on the computer half shells.

TEST METHOD

1. Verify inputs are connected correctly.

2. Verify the software functions are processed accurately by the hardware.

3. Verify that the control processing and peripheral hardware operates in a manner to satisfy all requirements.

4. Verify the accuracy of computer input parameters.

ACCEPTANCE CRITERIA

1. The P2500 Process Computer has been internally wired properly and the internal CPU, peripheral devices, Input/Output (I/O) and analog converters function properly.

2. The calibration and operation of the elements of the P2500 Plant Computer transmit accurate conversion, measurement and display of analog and digital input signals using the P2500 Plant Computer System.

3. Installed application programs perform as designed.

TABLE 14.2-1

EMERGENCY LIGHTING SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Standby and Emergency Lighting Systems to provide lighting in those locations where safety-related functions are performed.

PREREQUISITES

1. AC and DC electrical power supplies are available as required.

2. The battery-pack operated lighting units are in service.

TEST METHOD

1. Verify AC power supplies to standby lighting system are connected to proper safety train.

2. De-energize power supplies to the normal lighting and verify standby lighting system provides adequate illumination.

3. De-energize power supplies to normal lighting and power supplies to standby lighting systems and verify emergency 125 Volt DC and battery pack lighting energizes and provides adequate illumination.

ACCEPTANCE CRITERIA

1. The Standby and Emergency Lighting Systems operate in accordance with design requirements, supplying the required level of illumination to the required areas for the required duration as described in FSAR section 9.5.3.

2. The 125 Volt DC and battery pack lighting initiates when power to the AC standby lighting system is lost as described in FSAR section 9.5.3.

TABLE 14.2-1

COMMUNICATIONS SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Sound-Powered Telephone System and the Codes, Alarms and Paging (CAP) System to provide adequate communication coverage and audibility.

PREREQUISITES

1. Installation and construction testing of the Plant Communication and Evacuation Alarm Systems.

2. Plant equipment and systems are operating so as to create an ambient noise level that would be expected during normal plant operation.

TEST METHOD

1. Demonstrate proper functioning of the Sound-Powered Telephone System to provide intelligible reception and transmission of voice communications between assigned locations.

2. Verify proper functioning and audibility of the CAP System to provide paging and sound evacuation, fire, and medical alarms.

ACCEPTANCE CRITERIA

1. The codes, alarms, and paging system provides for audible paging and alarm signaling as described in FSAR section 9.5.2.

2. The sound powered telephone system provides for audible communication between locations described in FSAR section 9.5.2.

3. Evacuation, fire, and medical alarms, all clear signals and personnel pages are audible with normally expected background noise level.

TABLE 14.2-1

REACTOR PROTECTION SYSTEM
TEST SUMMARY

OBJECTIVE

The purpose of this test is to verify the capability of the Reactor Protection System (RPS) to perform protective functions and to verify satisfactory RPS response times.

PREREQUISITE

1. Electrical power must be available to operate the reactor plant and electrical systems, instruments and reactor protection system equipment and recorders.

2. Lead/Lag coefficients will be set according to Precautions, Limitations and Setpoints requirements and the circuitry is operable. There will be no attempt to defeat or desensitize the effect of lead/lag compensation for this test.

3. Associated instrumentation systems will be complete, aligned and calibrated in accordance with the Precautions, Limitations, and Setpoints Document.

TEST METHOD

1. Demonstrate proper operation of the RPS and Engineered Safety Features Actuation System.

2. Determine the process fluid variable to sensor input delay time analytically.

3. Determine RPS sensor response time using simulated input signals.

4. Verify the Eagle 21 delay time is within design requirements.

5. Verify the response of the logic channels for all logic combinations.

6. Determine reactor trip and bypass breaker delay time.

7. Compile the total reactor trip and ESFAS time response.

ACCEPTANCE CRITERIA

1. The Reactor Protection System and Engineered Safety Features Actuation System functions in response to logic initiation signals in accordance with the design requirements as described in FSAR sections 7.2 and 7.3 and design drawings.

2. Response time of the RPS logic channels including RPS sensors is in accordance with design requirements and the Technical Specifications and Requirements Document.

TABLE 14.2-1

ROD CONTROL SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate operability of the Rod Control System as installed prior to fuel load.

PREREQUISITES

1. The control rod drive mechanisms (CRDM) are connected without drive shafts installed.

2. The control rod drive system has been aligned in accordance with vendor instructions.

3. Electrical power supplies are available for operation.

TEST METHOD

1. Verify proper operation of the control rod drive motor-generator (MG) sets.

2. Verify correct rod drive mechanism magnetic coil polarity.

3. Verify correct sequencing of the control rod drive mechanisms.

4. Verify system operation in both manual and automatic modes up to maximum operating speeds using simulated input signals as applicable.

5. Verify operation of rod position step counters and bank overlap.

6. Verify proper operation of alarms and interlocks using simulated input signals as applicable.

7. Record the response time between a reactor trip breaker opening and the loss of gripper coil voltage.

ACCEPTANCE CRITERIA

1. The control rod drive system functions in the manual and automatic modes in accordance with vendor manuals, applicable design documents, and as described in FSAR Section 7.7.1.2.

2. The control rod drive MG sets operate in accordance with vendor technical manuals and applicable design documents.

TABLE 14.2-1

ROD CONTROL SYSTEM
TEST SUMMARY

ACCEPTANCE CRITERIA (cont'd)

3. The rod drive mechanisms properly sequence in accordance with vendor technical manuals.

4. The magnetic coil polarity for each CRDM is in accordance with vendor technical manuals.

NOTE: CRDM coil current amplitude cannot be verified without drive shafts.

TABLE 14.2-1

REACTOR PRESSURE BOUNDARY (RCPB) LEAKAGE DETECTION SYSTEM TEST SUMMARY

OBJECTIVE

Demonstrate that the instrumentation used to detect reactor coolant leakage is functional.

PREREQUISITES

1. Instruments are installed and available for testing.

TEST METHOD

1. Verify calibration and sensitivity of the humidity monitor and its proper annunciation and recording.

2. Verify proper calibration and annunciation of the reactor vessel flange leakoff, containment pressure, and temperature monitors.

3. Verify proper operation and annunciation of an abnormal rate of rise in the Reactor Building floor and equipment drain sump.

4. Verify proper operation of containment temperature detectors and instrumentation.

5. Provide actual or simulated input signals to verify operation of alarms, controls, interlocks, and instrumentation.

ACCEPTANCE CRITERIA

1. Instrumentation and alarms operate properly and in accordance with design requirements as described in FSAR section 5.2.7.

Note: Containment air particulate and radioactive gas monitors are addressed in the test summaries for the Area and Process Radiation Monitoring System.

TABLE 14.2-1

EXCORE NUCLEAR INSTRUMENTATION
TEST SUMMARY

OBJECTIVE

To demonstrate the operability of the Nuclear Instrumentation System including its ability to provide required indications, alarms, control and protective functions.

PREREQUISITES

1. The Nuclear Instrumentation System is installed and the calibration and alignment has been completed according to the manufacturer's instructions.

2. System has been operational for at least 1 hour.

3. The Solid State Protection System, Auxiliary Relay Panels, and the Annunciator System are operational as required to support this test.

TEST METHOD

1. Demonstrate the capability of source, intermediate and power range circuitry to respond to simulated test signals.

2. Verify that the source range detectors properly respond to a neutron source.

3. Demonstrate proper operation of the auctioneered circuits and flux channel deviation signals.

4. Check all channels to verify high level trip functions, alarm setpoints, and audible count rates where applicable.

ACCEPTANCE CRITERIA

1. The control and indication functions and associated setpoints of the Nuclear Instrumentation System function in accordance with design requirements as described in FSAR section 7.2 and the Precautions, Limitations and Setpoint Document.

2. The Nuclear Instrumentation System output signals to the reactor protection system function in accordance with FSAR section 7.2.

3. Source range detectors respond properly to a neutron source.

4. The source range detectors are not affected by electrical noise.

TABLE 14.2-1

LOOSE PARTS MONITORING SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Loose Parts Monitoring System to detect and record acoustic disturbances which may be indicative of loose parts in the Reactor Coolant System.

PREREQUISITES

1. Electrical power supplies are available for operation.

2. Plant conditions are established to allow operation of the reactor coolant pumps.

TEST METHOD

1. Operate the system to verify proper operation of installed sensors, alarms, recorders, and audio monitors.

2. Operate each of the solenoid operated calibration devices to verify proper function of each recorded channel.

ACCEPTANCE CRITERIA

1. The system operates in accordance with vendor instructions, applicable design documents and as described in FSAR Section 7.6.7.

2. A signal from any sensor is sufficient to trip the trim balance analyzer.

TABLE 14.2-1

SEISMIC INSTRUMENTATION
TEST SUMMARY

OBJECTIVE

To demonstrate the operability of installed seismic instrumentation and its capability to monitor and record.

PREREQUISITES

1. A calibrated seismic test signal is available as required by the vendor manuals..

TEST METHOD

1. Verify a seismic test signal will activate the instrumentation as required at an acceptable level.

2. Demonstrate proper operation of seismic instrumentation components and alarms, including the triggering device, recording and playback system, and peak acceleration recorders.

ACCEPTANCE CRITERIA

1. The seismic instrumentation is capable of being aligned in accordance with the vendor technical manual.

2. The system instruments, including trip settings, demonstrate correct response and outputs in response to simulated input signals as described in FSAR section 3.7.4.

TABLE 14.2-1

MAIN STEAM SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the operability and performance of Main Steam components during hot functional testing.

PREREQUISITES

1. Steam dump control system is operational.

2. Main condenser and circulating water system are in operation.

3. Plant conditions during hot functional testing are established as necessary for test conduct.

4. All support systems required to perform the test are in service.

TEST METHOD

1. Demonstrate proper operation of the turbine bypass system (condenser steam dump valves) to actual or simulated signals.

2. Verify Main Steam components, controls, interlocks and alarms function properly in response to simulated or actual signals.

ACCEPTANCE CRITERIA

1. Main Steam components, controls, interlocks and alarms function in accordance with the requirements of FSAR section 10.3 and associated design drawings.

2. The Turbine Bypass system (condenser steam dump valves) operate in accordance with the requirements of FSAR section 10.4.4 and associated design drawings.

TABLE 14.2-1

STEAM GENERATOR SAFETY & ATMOSPHERIC RELIEF VALVES
TEST SUMMARY

OBJECTIVE

To demonstrate the operability of the main steam atmospheric relief valves and to verify the setpoints of main steam safety valves associated with each steam generator.

PREREQUISITES

1. Plant conditions are established as necessary for test performance.

2. A pressure-assist device is available for use in lifting the safety valves and equipment is available to measure lift pressures.

3. Test equipment is available to measure the atmospheric relief valve stroke time.

TEST METHOD

1. Verify proper actuation and operation of the atmospheric relief valves at normal system operating pressure.

2. Lift each safety valve with a pressure-assist device and measure the lifting pressure to ensure setpoints are as required.

3. Determine the full stroke time of each atmospheric relief valve at normal system operating pressure.

ACCEPTANCE CRITERIA

1. Operation of the steam generator atmospheric relief valves and setpoints of the safety valves are in accordance with design requirements as described in the FSAR section 10.3.2.

2. The relief and safety valves reseat properly and do not chatter.

TABLE 14.2-1

MAIN STEAM AND FEEDWATER ISOLATION VALVES
TEST SUMMARY

OBJECTIVE

To demonstrate the operability of the Main Steam and Feedwater isolation and bypass isolation valves including their ability to close automatically as required.

PREREQUISITES

1. Plant conditions are established as required for test performance.

2. Electrical power and control air is available.

3. The solid state protection system is operable.

4. Test equipment is available to measure the valve closure time.

TEST METHOD

1. Demonstrate remote and control room operation of the isolation valves.

2. Verify the capability of the isolation valves to close upon receipt of an isolation signal.

3. Measure the closure time of isolation and bypass valves.

4. Verify the isolation valves will close upon receipt of a simulated signal from either power train.

ACCEPTANCE CRITERIA

1. The main steam and feedwater isolation valves and bypass valves close upon receipt of an isolation signal in accordance with FSAR section 6.2.4, 10.3 and 10.4.7 as applicable.

2. Isolation valve closure time is in accordance with the Technical Specification requirements.

3. Controls, interlocks, alarms and operation of the main steam, feedwater isolation valves and bypass valves is in accordance with FSAR section 10.3 and 10.4.7 and the associated design drawings.

TABLE 14.2-1

STEAM GENERATOR BLOWDOWN SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability and performance of the Steam Generator Blowdown (SGBD) system and components to adequately control steam generator water chemistry.

PREREQUISITES

1. AC and DC electrical power is available.

2. Control air is available for component operation.

3. The condenser and cooling towers are available.

4. Plant conditions are established as necessary for test performance.

TEST METHOD

1. Demonstrate the SGBD isolation valves close upon required isolation signals.

2. Demonstrate SGBD flowpaths in normal and flood mode conditions.

3. Verify the SGBD system can maintain proper steam generator water chemistry during hot functional testing. Verify design blowdown rates can be achieved.

4. Demonstrate proper operation of the SGBD flash tank and pumps.

5. Verify SGBD controls divert blowdown from the cooling tower upon a high radiation signal.

6. Verify controls, interlocks and alarms function properly in response to actual or simulated signals.

ACCEPTANCE CRITERIA

1. SGBD components, control, interlocks and alarms function in accordance with FSAR section 10.4.8 and associated design documents.

2. The SGBD system can achieve design blowdown rates and maintain steam generator chemistry as required by FSAR section 10.4.8.

TABLE 14.2-1

FEEDWATER SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Main Feedwater System to provide a regulated supply of water to the steam generators in response to steam generator level control demand.

PREREQUISITES

1. System sufficiently complete to support testing.

2. AC and DC electrical power supplies are available.

3. Control air is available for component operation.

4. The Condensate System is available and a adequate supply of clean water is available in the condenser hotwell and condensate storage tank.

5. The system is aligned for normal operation.

6. The steam generator feedwater pumps and associated lube oil and seal water auxiliaries are operational.

7. The automatic steam generator level controls for feedwater regulating and bypass valves have been calibrated and are operational.

TEST METHOD

1. Verify proper operation of the feedwater system controls, interlocks and alarms by normal operation or simulation of required input signals.

2. Operate the main (turbine driven) and standby (motor driven) feedwater pumps and verify performance on recirculation path during Integrated Hot Functional Tests.

ACCEPTANCE CRITERIA

1. The minimum flow capability of the main and standby feedwater pumps meets or exceeds design requirements as described in FSAR section 10.4.7.

2. Automatic and manual controls, interlocks, and alarms operate properly in accordance with design drawings.

TABLE 14.2-1

CONDENSATE AND CONDENSER VACUUM SYSTEM TEST SUMMARY

OBJECTIVE

To demonstrate the Condensate and Condenser Vacuum Systems are capable of providing an adequate supply of high quality deaerated water to the Feedwater System and maintain condenser water levels within operational limits.

PREREQUISITES

1. System sufficiently complete to support testing.

2. AC and DC electrical power supplies are available.

3. Control air is available for component operation.

4. A adequate supply of clean water is available in the condenser hotwell and condensate storage tank.

5. The vacuum pumps are operable and support systems including seal and cooling water are available.

6. The Condensate and Condenser Vacuum system is aligned for normal operation.

TEST METHOD

1. Verify proper operation and minimum flow capabilities, as applicable, to the condenser hotwell pumps, condensate booster pumps, demineralizer condensate pumps, and condensate transfer pump.

2. Demonstrate proper differential pressure control and flow through the condensate polishing demineralizers and verify water quality of condensate polisher effluent.

3. Demonstrate the operation of the condensate transfer pumps including head and flow characteristics.

4. Demonstrate level controls will maintain proper hotwell level.

5. Demonstrate the capability of the condenser vacuum system to draw and maintain a vacuum on the condenser and verify proper operation of the vacuum pumps.

6. Verify proper operation of the condensate and condenser vacuum system controls, interlocks and alarms by normal operation or simulation of required input signals.

TABLE 14.2-1

CONDENSATE AND CONDENSER VACUUM SYSTEM
TEST SUMMARY

ACCEPTANCE CRITERIA

1. The minimum flow capability of the hotwell pumps, condensate booster pumps, demineralizer condensate pumps, and condensate transfer pump meets or exceeds design requirements as described in FSAR section 10.4.7.

2. The condensate polishing demineralizers produce condensate quality water at design flow and pressure conditions as described in FSAR section 10.4.6.

3. The condensate vacuum pumps can draw and maintain condenser vacuum in accordance with design requirements described in FSAR section 10.4.2

4. Automatic and manual controls, interlocks, and alarms operate properly in accordance with design drawings.

TABLE 14.2-1

CONDENSER CIRCULATING WATER SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Condenser Circulating Water (CCW) system to provide adequate cooling to the main turbine condensers for removing and dissipating waste heat from the power generation cycle.

PREREQUISITES

1. All instrumentation and electrical equipment associated with the CCW system has been tested and calibrated.

2. The main turbine condenser is operational.

3. The cooling tower is available with adequate water in the basin.

4. The CCW system is filled and vented.

TEST METHOD

1. Operate the CCW system with various pump configurations and verify pump hydraulic performance and proper flow to the condensers.

2. Verify all CCW components controls, interlocks and alarms function properly to actual or simulated signals.

ACCEPTANCE CRITERIA

1. Condenser Circulating Water system and components operate at design conditions in accordance with FSAR section 10.4.5 and associated design drawings.

TABLE 14.2-1

AUXILIARY FEEDWATER SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability and reliability of the Auxiliary Feedwater System to supply feedwater to the steam generators and to maintain steam generator water inventory as required.

PREREQUISITES

1. Verify system is configured as necessary for unit/plant operation.

2. Steam supply is available for the turbine-driven Auxiliary Feedwater pump.

3. An acceptable water supply is available for the Condensate Storage Tank.

4. Interfacing systems needed to support testing of the Auxiliary Feedwater System are available.

TEST METHOD

1. Demonstrate proper manual and automatic operation of suction and discharge valves on the motor and turbine driven pumps and the steam supply to the turbine-driven pump.

2. Verify proper functioning of local and remote means of component control.

3. Verify that the hydraulic performance of each pump meets design requirements.

4. Demonstrate that the motor driven and turbine-driven pumps are capable of delivering rated flow to the steam generators within the acceptable time after an initiating signal.

5. Check for proper operation of the steam driven AF pump instrumentation, control interlocks and alarms including governor valve and turbine speed control.

6. Verify the capability of the flow limiter to prevent pump runout.

7. Verify the operability of the Essential Raw Cooling Water System interface with the Auxiliary Feedwater Suction Header (essential raw cooling water will not be introduced into the Auxiliary Feedwater System).

TABLE 14.2-1

AUXILIARY FEEDWATER SYSTEM
TEST SUMMARY

TEST METHOD (continued)

8. Feedwater bypass line check valves operate properly.

9. Start the steam driven auxiliary feedwater pump five consecutive times from a cold condition.

ACCEPTANCE CRITERIA

1. The hydraulic performance of the auxiliary feedwater pumps meets or exceeds design requirements as described in FSAR section 10.4.9.

2. Automatic and manual (local and remote) controls, interlocks, and alarms operate in accordance with design drawings.

3. Flow restrictors prevent pump flow from exceeding run-out condition.

4. The auxiliary feedwater pumps deliver rated flow within the time required by design as described in FSAR section 10.4.9.

5. The steam driven auxiliary feedwater pump successfully starts and achieves rated speed within the time required five consecutive times from a cold condition.

TABLE 14.2-1

THERMAL EXPANSION TEST SUMMARY

OBJECTIVE

To demonstrate that Reactor Coolant System components and specified safety-related systems designated as ASME Class 1, 2, and 3, with operating temperatures greater than 200° F, experience thermal expansion consistent with design. Additionally, to verify that specified system support components do not interfere with the pipe thermal growth.

PREREQUISITES

1. The specified piping and support components selected for thermal expansion have been reviewed to ensure all hangers which allow or restrict thermal growth have been installed and adjusted.

2. Preliminary shimming has been completed and shim crevice and support surfaces have been inspected to ensure debris has been removed.

3. The required heat load for thermal expansion testing is available.

4. Pipe whip restraints have been properly set to allow specified piping to move without obstruction or binding.

5. Preservice examination of all snubbers on specified systems is complete.

TEST METHOD

1. While monitoring at predetermined points in discrete temperature step increments, verify that the selected systems can expand without obstruction or interference during system heatup from ambient to operating conditions.

2. Inspect snubbers and spring cans at specified temperature intervals to ensure their thermal movements are within the criteria per applicable design drawings.

3. Verify that the selected system piping and components are capable of returning to their cold position within specified tolerance limits.

TABLE 14.2-1

THERMAL EXPANSION
TEST SUMMARY

ACCEPTANCE CRITERIA

The piping systems are free to expand thermally without restriction other than by design. Spring hanger movements remain within their working range and snubbers have not become fully extended or retracted. The measured thermal movement data shall be within the design analytical predicted value, or reconciled by the Engineering Department.

TABLE 14.2-1

FUEL HANDLING AND VESSEL SERVICING EQUIPMENT
TEST SUMMARY

OBJECTIVE

To demonstrate the operability of the fuel handling and vessel servicing equipment, including the handling tools and equipment, cranes and fuel transfer system.

To provide for final indexing of the manipulator crane and to establish reference marks for the manipulator crane bridge using a verified dimensionally correct dummy assembly.

To provide the opportunity for training fuel handlers prior to actual fuel loading.

PREREQUISITES

1. The refueling cavity, refueling canal and spent fuel pool are clean and areas adjacent to the system equipment are clear.

2. Dummy assembly, test weights and test fixtures are available as required for testing the manipulator crane and spent fuel bridge crane.

3. Load testing of the reactor head and internals lifting fixtures has been completed.

TEST METHOD

1. With the use of a dummy assembly demonstrate the proper operation of all system components, including the manipulator crane, spent fuel pit bridge and electric hoist, new fuel elevator, fuel transfer system, rod control cluster control changing fixtures, various handling tools, and indexing of the system.

2. Verify operation of interlocks and proper setting of limit switches.

3. Demonstrate proper operation of crane and hoist controls including overspeed, overloads and travel limits, and warning devices.

4. Demonstrate hoist, bridge and trolley travel is acceptable.

5. Verify the operation of the hoist braking systems.

6. Perform a 125% static load test and a 100% full load operational test on the Manipulator Crane and the Spent Fuel Pit Bridge Crane, Reactor Building Polar Crane and the Auxiliary Building Overhead Crane.

TABLE 14.2-1

FUEL HANDLING AND VESSEL SERVICING EQUIPMENT
TEST SUMMARY

ACCEPTANCE CRITERIA

Fuel transfer system operation,controls and interlocks function in accordance with FSAR section 9.1.4 and the vendor technical manual and drawings.

All Manipulator Crane operation controls and interlocks function in accordance with FSAR section 9.1.4 and the vendor technical manual and drawings.

The RCC change fixture's function to remove, store, and load RCC's has been successfully demonstrated in accordance with FSAR section 9.1.4.

Final Manipulator Crane indexing is completed and the Manipulator Crane has proven repeatability at various core locations.

Spent Fuel Pit Bridge, Reactor Building Polar and Auxiliary Building overhead crane controls and interlocks function in accordance with the appropriate design drawings and technical manuals.

Manipulator Crane, the Spent Fuel Pit Bridge Crane, Reactor Building Polar Crane and the Auxiliary Building Overhead Crane have been successfully load tested.

TABLE 14.2-1

REACTOR COOLANT SYSTEM COLD HYDROSTATIC TEST
TEST SUMMARY

OBJECTIVE

To verify the integrity and leak-tightness of the Reactor Coolant System (RCS) and high pressure portion of systems connected to the RCS, by performing a hydrostatic test of the system in accordance with Section III of the ASME Boiler and Pressure Vessel Code.

PREREQUISITES

1. The reciprocating charging pump is operational.

2. A water supply within acceptable chemistry and temperature limits is available for pressurizing the reactor coolant system.

3. The reactor coolant pumps are operational.

4. The reactor lower internals, upper internals, and vessel head are installed and the head studs are tensioned for hydrostatic test pressure.

5. Temporary temperature and pressure test instrumentation is calibrated and installed or available.

TEST METHOD

1. The reactor coolant pumps will be operated as required to properly vent the RCS and establish the required temperature prior to pressurizing the RCS to test pressure.

2. Pressurize the RCS within the maximum rate and in the prescribed increments until the desired test pressure is obtained, and stabilize at the test pressure for the required time.

3. Perform inspections of welds, joints, piping, and components within the test boundary.

4. Reduce system pressure to below test pressure.

ACCEPTANCE CRITERIA

1. No leakage from welds within the test boundary is observed.

2. Test pressure is maintained for the time required by Section III of the ASME Boiler and Pressure Vessel Code.

TABLE 14.2-1

INTEGRATED HOT FUNCTIONAL TESTS
TEST SUMMARY

OBJECTIVE

To establish initial plant conditions required for performance of preoperational and acceptance tests of primary, secondary, and auxiliary systems which require normal operating temperature and pressure of the reactor coolant system. The HFT procedure will control plant conditions as required to properly sequence these tests during heatup, while at normal operating temperature and pressure, and during cooldown.

To perform operational checks of the reactor coolant system components including pumps, motors, valves, instruments used during plant heatup from cold shutdown conditions to normal operating temperature and pressure prior to core loading. This heatup/cooldown also affords the opportunity to demonstrate the adequacy of plant operating procedures.

To collect any foreign material, having a cross section greater than 1/16 inch, which may be present in the reactor coolant system.

To operate the reactor coolant system at full flow conditions for a minimum of 240 cumulative hours to achieve one million vibration cycles of the reactor internals.

PREREQUISITES

1. The RCS Cold Hydrostatic Test has been completed.

2. All systems, or portions of systems, and components whose adequacy or proper operations are to be verified under hot plant conditions, are operational.

3. The reactor vessel internals vibration baseline inspection has been completed and the internals are installed.

4. Full flow filters have been installed in the reactor vessel.

5. The reactor coolant system has been filled and vented.

6. Prior to demonstrating remote shutdown capability, establish the prerequisites required by Regulatory Position C.2 and minimum crew size required by Regulatory Position C.3 of Regulatory Guide 1.68.2, Revision 1.

TABLE 14.2-1

INTEGRATED HOT FUNCTIONAL TESTS
TEST SUMMARY

TEST METHOD

1. Heat the RCS to normal operating temperature and pressure using heat from the reactor coolant pumps and pressurizer heaters. Verify proper operation of the reactor coolant pumps, motors, and seals.

2. Verify the thermal expansion of system components and piping.

3. Perform isothermal calibration of Resistance Temperature Detector and incore thermocouples.

4. Verify capability of the Chemical and Volume Control System to provide charging water at rated flow against normal reactor coolant pressure, check letdown design flow rate for each applicable operating mode, and check response of the system to changes in pressurizer level.

5. Verify proper operation of steam generator instrumentation to changes in steam generator level.

6. Demonstrate proper functioning of the main steam isolation and bypass valves under normal operating pressures and temperature conditions.

7. Operate the RC pumps for a minimum of 240 hours at full flow in order to achieve greater than one million cycles on the vessel internals. Following hot functional testing, the internals are to be removed and inspected for vibration effects.

8. Perform periodic vibrations measurements on RCS components as required.

9. Verify acceptability of the excess letdown and seal water flows.

10. Demonstrate proper operation of the pressurizer pressure control system.

11. Demonstrate proper operation of the steam dump control system.

12. Demonstrate proper operation of the RV head vent system.

13. Demonstrate proper operation of the motor and steam driven auxiliary feedwater pumps.

TABLE 14.2-1

INTEGRATED HOT FUNCTIONAL TESTS
TEST SUMMARY

TEST METHOD (continued)

14. Demonstrate the ability to cooldown the plant in a controlled manner from the Main Control Room and from outside the Main Control Room (Auxiliary Control Room). During cooldown from outside the control room, the RCS pressure and temperature will be reduced to allow operation of the RHR system and subsequent cooldown of at least 50 degrees using RHR in accordance with Regulatory Position C.4 of Regulatory Guide 1.68.2, Revision 1.

ACCEPTANCE CRITERIA

1. The Reactor Coolant System has been operated at full flow conditions for a minimum of 240 cumulative hours.

2. Tests requiring the RCS to be at normal operating pressure and temperature have been completed.

3. Automatic controls, alarms, and interlocks operate in accordance with design drawings.

4. Rector coolant pumps operate in accordance in accordance with vendor documents.

TABLE 14.2-1

OPERATIONAL VIBRATION TESTING
TEST SUMMARY

OBJECTIVE

To verify acceptable vibration levels exist for all (1) Class 1, 2, and 3 piping (2) other high-energy piping systems inside Seismic Category I Structures, (3) high-energy portions of systems, whose failure could reduce the functioning of any Seismic Category I Plant Feature to an unacceptable level.

PREREQUISITES

1. Systems are operational as required.

2. Instrumentation is in place for testing as required.

TEST METHOD

1. Subject the specified piping systems to various flow modes and transients such as pump trips and valve closures as required.

2. Visually inspect and/or measure the vibration level of the piping and components at the specified locations.

3. Following completion of the system transient test, visually inspect the piping and supports including snubbers for damage, looseness of parts, etc.

ACCEPTANCE CRITERIA

The vibration level for piping and components are within acceptable limits in accordance with the requirements of FSAR Sections 3.9.2.1.

TABLE 14.2-1

CONTAINMENT LOCAL LEAK RATE TESTS
TEST SUMMARY

OBJECTIVE

To determine the leakage rate across each pressure-containing or leakage-limiting boundary for primary containment penetrations as applicable, including containment isolation valves.

PREREQUISITES

1. Equipment is available and calibrated to provide measurement of the local leak rate at penetrations, containment isolation valves, and air locks.

TEST METHOD

1. Examine the individual containment penetrations and containment isolation valves for leakage in accordance with Appendix J of 10 CFR Part 50.

2. Measure the leakage rate across each containment penetration pressure-containing or leakage-limiting boundary, as applicable, in accordance with Appendix J of 10 CFR Part 50.

3. Determine path leakage rates for valves in secondary containment bypass leakage paths.

ACCEPTANCE CRITERIA

The Containment Local Leak Rate Tests meet the requirement of 10CFR Part 50, Appendix J.

TABLE 14.2-1

CONTAINMENT INTEGRATED LEAK RATE TEST
TEST SUMMARY

OBJECTIVE

To verify the primary reactor containment overall integrated leakage rate is within acceptable limits.

PREREQUISITES

1. Fluid system conditions are established as applicable to simulate post accident conditions which extend the boundary of the Containment Building.

2. Containment pressure retaining boundary, leakage limiting boundary, and isolation valve leak tests have been satisfactorily performed.

3. All containment isolation valves have been closed by normal actuation methods.

4. The vendor containment over pressurization (structural integrity) test has been successfully completed.

TEST METHOD

1. Perform the containment integrated leak rate test per Appendix J to 10 CFR Part 50.

2. Perform the leakage rate calculation by using the mass-point methodology as described by ANSI/ANI 56.8-1987, ANSI N45.4-1972, and BN-TOP-1.

3. If during the performance of a type A test, excessive leakage occurs through locally testable penetrations or isolation valves, these leakage paths may be isolated and the Type A test continued until completion. The sum of the post repaired minimum pathway local leakage rate values will be added to the UCL per ANSI 56.8-1981.

ACCEPTANCE CRITERIA

The Containment Integrated Leak Rate Test meets the requirements of Appendix J to 10 CFR Part 50.

Note:

The containment structural integrity test described in FSAR Section 3.8 may be performed concurrently with the Integrated Leak Rate Test.

TABLE 14.2-1

CONTAINMENT ISOLATION
TEST SUMMARY

OBJECTIVE

Demonstrate the capability of various plant system components to properly respond to Phase A and Phase B containment isolation signals and to containment ventilation isolation signals.

PREREQUISITES

1. All systems with applicable automatic containment isolation valves are in a status allowing operation of these valves.

TEST METHOD

1. Verify manual operation of all containment isolation valves.

2. Verify all valves designed to isolate containment in response to Phase A and Phase B containment isolation and containment ventilation isolation signals properly actuate in response to these signals.

3. Demonstrate the operation and independence of redundant trains of containment isolation components.

4. Verify air operated valves fail to the accident position upon loss of air or electrical power.

5. Measure the time required for isolation valves to close.

6. After isolation valve closure, reset the isolation signal and verify the isolation valve remains in the accident position.

ACCEPTANCE CRITERIA

1. All containment isolation valves designed to isolate on receipt of a Phase A or Phase B containment isolation signal or containment ventilation isolation signal properly respond to receipt of the appropriate signal as described in FSAR section 6.2.4.

2. The closure time of containment isolation valves is equal to or less than the time requirements specified in FSAR Table 6.2.4-1.

3. Containment isolation valves remain in the accident position after reset of the isolation signal.

TABLE 14.2-1

INADEQUATE CORE COOLING MONITORING SYSTEM TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Inadequate Core Cooling Monitoring (ICCM) System to detect the approach to or existence of inadequate core cooling by indication of collapsed water level in the Reactor Vessel, the formation of a void in the Reactor Coolant System, high incore thermocouple temperatures, or loss of required subcooling margin.

PREREQUISITES

1. Reactor vessel head is installed.

2. Initial ICCM checkout is complete.

3. Eagle 21 checkout procedure is complete for process protection system racks supplying inputs to ICCM.

4. Hot functional testing is in progress.

TEST METHOD

1. Monitor indicators and recorders in the main control room during varying reactor coolant system conditions.

2. Observe all pages of the plasma display to verify operability.

3. Simulate malfunction conditions to verify malfunction alarms.

4. Simulate loss of subcooling margin to verify main control room alarm via the plant computer.

ACCEPTANCE CRITERIA

1. Main control room indicators and recorders, including all pages of the plasma display, respond properly to changes in reactor coolant system conditions.

2. The main control room alarms are initiated for ICCM simulated malfunction conditions.

3. The main control room alarm is initiated for simulated loss of subcooling margin.

TABLE 14.2-1

ANTICIPATED TRANSIENT WITHOUT SCRAM MITIGATION SYSTEM ACTUATION CIRCUITRY TEST SUMMARY

OBJECTIVE

Demonstrate the capability of the Anticipated Transients Without Scram Mitigation System Actuation Circuitry (AMSAC) to respond properly to initiation signals.

PREREQUISITES

1. Interfacing systems such as the Annunciator System are available.

2. Instrument loops providing input to AMSAC.

TEST METHOD

1. Simulating transmitter input, verify AMSAC functions properly with the appropriate Turbine impulse pressure (simulated power), steam generator level, and block switch position conditions.

2. Demonstrate AMSAC setpoints and time response requirements.

3. Verify proper annunciation from AMSAC System.

ACCEPTANCE CRITERIA

1. When AMSAC is armed and Steam Generator level coincidence logic is obtained, a Main Turbine trip signal and start signal for all Auxiliary Feedwater Pumps is generated. AMSAC test/block switch can block an AMSAC signal.

2. With AMSAC armed at ≥40% simulated power, Steam Generator low-low level logic setpoint is ≥12% of narrow range level and less than the RPS low-low level trip setpoint. With AMSAC armed at ≥80% simulated power, Steam Generator low-low level logic setpoint is ≥25% of narrow gauge level and less than the RPS low-low level trip setpoint.

3. AMSAC logic and output relay actuation response time is ≤1.0 seconds. AMSAC actuation time delay including sensor, logic and output relay actuation response time is ≤30 seconds.

4. AMSAC status lights and annunciators respond as designed.

TABLE 14.2-1

COMPRESSED AIR SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the capability of the Compressed Air System to provide regulated air that is clean, dry and oil-free to instrumentation and control loads during normal plant operation and to vital equipment required for safe shutdown under design basis event conditions.

PREREQUISITES

1. AC and DC electrical power supplies are available.

2. The system has been blown-down and verified to be clean in accordance with approved cleanliness standards.

3. Cooling water is available.

4. The system filters are installed and dryers loaded with desiccant.

TEST METHOD

1. Simulate signals required to verify proper operation of automatic controls, interlocks, and alarms including:

   a. Automatic isolation of the Auxiliary Air System from the Station Air System on loss of air pressure in the Station Air System.

   b. Automatic start of the Auxiliary Air Compressors on receipt of a low auxiliary control air header pressure signal.

2. Verify automatic operation of air dryers for one regeneration cycle.

3. Measure the dewpoint of Station Control Air and Auxiliary Control Air.

4. Operate the station air compressors and auxiliary air compressors to verify proper operation of unit controls and cooling water. Verify proper compressor capacity and pressure.

5. Perform a slow loss of Auxiliary Control Air System pressure by isolating as many branch lines as practical with the affected loads in their normal operating position to verify response of supplied loads.

TABLE 14.2-1

COMPRESSED AIR SYSTEM
TEST SUMMARY

TEST METHOD (continued)

6. With the Auxiliary Control Air System operating in a steady state condition, operate at least two of the highest demand loads supplied from the same train, simultaneously.

ACCEPTANCE CRITERIA

1. The station air compressors, auxiliary air compressors and associated air dryers properly operate to provide compressed air that meets or exceeds design requirements for air-flow and dewpoint and is within design pressure limits as described in FSAR section 9.3.1.

2. Automatic controls including system isolation features, interlocks, and alarms operate in accordance with design drawings.

3. Auxiliary Control Air loads respond properly to a slow loss of system air pressure as described by design documents.

4. Simultaneous operation of the two highest demand loads supplied from each train will not cause unacceptable system pressure transients as described in applicable design documents.

TABLE 14.2-1

ICE CONDENSER SYSTEM
TEST SUMMARY

OBJECTIVE

To demonstrate the operability of the Ice Condenser, Doors, associated air handling components, glycol circulation, refrigeration, floor cooling, and drain subsystems.

PREREQUISITES

1. All system components have been installed.

2. The Raw Cooling Water System and Demineralized Water System are available.

3. System relief valve setpoints have been verified.

4. Heat tracing is installed on Air Handling Unit drains and is available for use.

5. Air handling units, glycol circulation and refrigeration equipment is operable.

TEST METHOD

1. Demonstrate the proper operation of the refrigeration chiller packages, glycol circulation equipment, air handling units and the floor cooling and drain system.

2. Demonstrate the ice condenser can be adequately cooled to and maintained at design conditions.

3. Verify the ice condenser has been loaded with the proper quantity and quality of the ice.

4. Verify all system controls, interlocks, instrumentation, heat tracing, and alarms function properly to simulated or actual signals.

ACCEPTANCE CRITERIA

1. The Ice Condenser System components, controls, interlocks, instrumentation and alarms function in accordance with FSAR section 6.7 and the appropriate design basis documents.

2. The Ice Condenser has been loaded with the proper quantity and quality of borated ice as required in FSAR section 6.7.

TABLE 14.2-1

PRESSURIZER SAFETY AND RELIEF VALVES
TEST SUMMARY

OBJECTIVE

To demonstrate the proper operation of the pressurizer power-operated relief valves, pressurizer relief tank, and leaktightness of the pressurizer relief and safety valves.

PREREQUISITES

1. Plant conditions are established as necessary for test performance.

2. The pressurizer relief tank is filled to its normal level.

3. Primary makeup water supply is available as required.

4. The pressurizer safety valves have been bench tested to verify their setpoints and installed.

TEST METHOD

1. Verify proper actuation and operation of the power-operated relief valves and isolation valves.

2. Check operation of the discharge header leak detection devices.

3. Verify proper operation of the pressurizer relief tank control systems, instrumentation, interlocks, and alarms.

4. Confirm that cooling spray to the pressurizer relief tank meets design requirements.

ACCEPTANCE CRITERIA

1. The pressurizer power-operated relief valves and isolation valves operate in accordance with design as described in FSAR sections 5.2.2.

2. The pressurizer relief tank controls and alarms operate in accordance with design as described in FSAR section 5.5.11 and applicable design documents.

3. Power operated relief valve and safety valve leakage is within technical specification limits.

4. Controls, instrumentation, interlocks and alarms operate properly in response to simulated or normal input signals as described in FSAR section 5.2.2 and applicable design documents.

TABLE 14.2-1

INTAKE PUMP STATION VENTILATION SYSTEM TEST SUMMARY

OBJECTIVE

Demonstrate proper operation of the Intake Pump Station (IPS) ventilation equipment.

PREREQUISITES

1. System sufficiently complete to support testing.

2. AC and DC electrical power supplies are available.

3. Control air is available for valve and damper operation.

TEST METHOD

1. Demonstrate proper operation of the ventilation supply and exhaust fans, shutoff louvers and dampers. Verify adequate flow to areas serviced by each portion of the system.

2. Verify all alarms and interlocks function properly.

3. Verify proper operation of the IPS unit and duct heaters.

ACCEPTANCE CRITERIA

1. The Essential Raw Cooling Water Intake Pumping Station Ventilation System maintains area temperatures and air flows as described in FSAR section 9.4.5.1.

2. Manual and automatic controls, interlocks, auto start features, alarms, function in accordance with design documents.

ENCLOSURE 4

WBN STARTUP AND TEST PROGRAM - TEST MATRIX

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
001	MAIN STEAM SYSTEM	S	Y	ATI-001-05	SECONDARY HYDRO TEST SEQUENCE	NOTE: Test complete-no addnl PTI to be performed
		S	Y	PTI-001-01	MAIN STEAM ISOLATION VALVES	MAIN STEAM & FEEDWATER ISOLATION VALVES
		S	Y	PTI-001-02	STEAM GENERATR PORVs & TURBINE BYPASS VLV TST	MAIN STEAM SYSTEM
		S	Y	PTI-001-02	STEAM GENERATR PORVs & TURBINE BYPASS VLV TST	STEAM GENERATOR SAFETY & ATMOSPHERIC RELIEF VLVS
		S	Y	PTI-001-02	STEAM GENERATR PORVs & TURBINE BYPASS VLV TST	STEAM GENERATOR SAFETY & ATMOSPHERIC RELIEF VLVS
		S	Y	PTI-001-03	MAIN STEAM SAFETY VLVE LIFT POINT	STEAM GENERATOR SAFETY & ATMOSPHERIC RELIEF VLVS
		S	Y	PTI-001-04	TURBINE BYPASS VALVE TEST	INTEGRATED HOT FUNCTIONAL TESTS
002	CONDENSATE SYSTEM		Y	PTI-002-01	CONDENSATE SYSTEM	CONDENSATE AND CONDENSER VACUUM SYSTEM
			Y	PTI-002-02	CONDENSER VACUUM	CONDENSATE AND CONDENSER VACUUM SYSTEM
003A	MAIN FEED WATER SYSTEM	S	Y	PTI-003A-01	FEEDWATER ISOLATION & BYPASS VLVES	MAIN STEAM & FEEDWATER ISOLATION VALVES
		S	Y	PTI-003A-02	FEEDWATER & STEAM GENERATOR LEVEL	INTEGRATED HOT FUNCTIONAL TESTS
		S	Y	PTI-003A-03	MAIN FEEDWATER PUMP TEST	FEEDWATER SYSTEM
003B	AUXILIARY FEEDWATER SYSTEM	S	Y	PTI-003B-04	AFW MOTOR DRIVEN TEST	INTEGRATED HOT FUNCTIONAL TESTS
		S	Y	PTI-003B-04	AFW MOTOR DRIVEN TEST	AUXILIARY FEEDWATER SYSTEM
		S	Y	PTI-003B-05	AUX FEEDWATER PUMP/TURBINE	INTEGRATED HOT FUNCTIONAL TESTS

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
		S	Y	PTI-003B-05	AUX FEEDWATER PUMP/TURBINE	AUXILIARY FEEDWATER SYSTEM
		S	Y	PTI-003B-06	ATWS CIRCUITRY TEST	ANTICIPATED TRANSIENT WITHOUT SCRAM
005	EXTRACTION STEAM		Y	ATI-005-01	EXTRACTION STEAM	
006	HEATER DRAINS AND VENTS SYSTEM		Y	ATI-006-01	HEATER DRAINS	
007	TURBINE EXTRACTION TRAPS AND DRAINS SYSTEM			NOTE #1		
012	AUXILIARY BOILER SYSTEM			NOTE #1		
013	FIRE DETECTION SYSTEM	S	Y	PTI-013-01	FIRE DETECTION	FIRE PROTECTION SYSTEM
014	CONDENSATE DEMINERALIZER SYSTEM		Y	ATI-014-01	CONDENSATE DEMERALIZERS	
015	STEAM GENERATOR BLOWDOWN SYSTEM	S	Y	PTI-015-01	STEAM GENERATOR BLOWDOWN	STEAM GENEATOR BLOWDOWN SYSTEM
018	FUEL OIL SYSTEM	S		ATI-018-01	FUEL OIL	
		S		PTI-082-01	DIESEL GENERATOR 1A	DIESEL GENERATOR
		S		PTI-082-02	DIESEL GENERATOR 2A	DIESEL GENERATOR
		S		PTI-082-03	DIESEL GENERATOR 1B	DIESEL GENERATOR
		S		PTI-082-04	DIESEL GENERATOR 2B	DIESEL GENERATOR

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
		S		PTI-082-05	CS DIESEL GENERATOR	DIESEL GENERATOR
020	CENTRAL LUBRICATING OIL SYSTEM			ATI-020-01	LUBE OIL SYSTEM	
024	RAW COOLING WATER SYSTEM		Y	ATI-024-01	RAW COOLING WATER SYSTEM	
025	RAW SERVICE WATER SYSTEM			NOTE #1		
026	HIGH PRESSURE FIRE PROTECTION SYSTEM	S	Y	PTI-026-01	HIGH PRESSURE FIRE PROTECTION	FIRE PROTECTION SYSTEM
027	CONDENSER CIRCULATING WATER SYSTEM		Y	PTI-027-01	CONDENSER CIRCULATING WATER	CONDENSER CIRCULATING WATER SYSTEM
028	WATER TREATMENT SYSTEM			NOTE #1		
029	POTABLE WATER DISTRIBUTION SYSTEM			NOTE #1		
030	VENTILATION	S	Y	AB-030-01	UPPER/LOWER CONT COOLERS AIR BALANCES	CONTAINMENT VENTILATION SYSTEM
		S	Y	AB-030A-01	AIR BALANCE	DIESEL GENERATOR BLDG VENTILATION SYSTEM
		S	Y	AB-030B-01	AIR BALANCE	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL
		S	Y	AB-030C-01	AIR BALANCE	AUX BLDG VENTILATION SYS PASF
		S	Y	AB-030D-01	AIR BALANCE	SECONDARY CONTAINMENT SYSTEM VENTILATION
		S	Y	AB-030E-01	AIR BALANCE	CONTAINMENT VENTILATION SYSTEM

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
		S	Y	AB-030F-01	AIR BALANCE	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL
		S	Y	AB-030K-01	AIR BALANCE	CONTAINMENT VENTILATION SYSTEM
		S		AB-030L-01	AIR BALANCE	CONTAINMENT VENTILATION SYSTEM
			Y	AB-030P-01	AIR BALANCE	INTAKE PUMP STATION VENTILATION SYSTEM
				ATI-030Q-01	HOT SHOP AREA HVAC ELECTRICAL	
				ATI-030R-01	SERVICE BLDG LAUNDRY ROOM	
		S	Y	PTI-030-01	HFT TEMPERATURE SURVEY	CONTAINMENT VENTILATION SYSTEM
		S	Y	PTI-030A-01	DIESEL BLDG HVAC ELECTRICAL	DIESEL GENERATOR BLDG VENTILATION SYSTEM
		S	Y	PTI-030A-02	ADDITIONAL DIESEL BLDG HVAC ELECT	DIESEL GENERATOR BLDG VENTILATION SYSTEM
		S	Y	PTI-030B-01	AUX/FUEL BLDG EXHAUST & SUPP	AUX BLDG VENTILATION SYS & PASF ENVIRONMENTAL CTRL
		S	Y	PTI-030C-01	AUX BLDG ROOM/AREA COOLER	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL
		S	Y	PTI-030C-02	AUX BLDG ROOM COOLER PERFORM	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL
		S	Y	PTI-030D-01	AUX BLDG GAS TREATMENT ELECT	SECONDARY CONTAINMENT SYSTEM VENTILATION
		S	Y	PTI-030D-02	AUX BLDG GAS TREATMENT FILTE	SECONDARY CONTAINMENT SYSTEM VENTILATION
		S	Y	PTI-030D-03	AUX BLDG GAS TREATMENT NEGATIVE	SECONDARY CONTAINMENT SYSTEM VENTILATION
		S	Y	PTI-030D-03	AUX BLDG GAS TREATMENT NEGATIVE	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL
		S	Y	PTI-030D-03	AUX BLDG GAS TREATMENT NEGATIVE	SECONDARY CONTAINMENT SYSTEM VENTILATION

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
		S	Y	PTI-030F-01	BATTERY EXHAUST FANS/DAMPER TEST	AUX BLDG VENTILATION SYS PASF
		S	Y	PTI-030I-01	CONTAINMENT PURGE ELECTRICAL TEST	CONTAINMENT VENTILATION SYSTEM
		S	Y	PTI-030I-02	CONTAINMENT PURGE FILTER TEST	CONTAINMENT VENTILATION SYSTEM
		S	Y	PTI-030J-01	LOWER CONTAINMENT COOLERS	CONTAINMENT VENTILATION SYSTEM
		S	Y	PTI-030J-02	UPPER CONTAINMENT COOLERS	CONTAINMENT VENTILATION SYSTEM
		S	Y	PTI-030K-01	CRDM COOLING UNIT ELECTRICAL TEST	CONTAINMENT VENTILATION SYSTEM
		S		PTI-030L-01	CONTAINMENT RETURN AIR FAN ELECTRIC	CONTAINMENT VENTILATION SYSTEM
			Y	PTI-030P-01	INTAKE PUMP STATION HVAC	INTAKE PUMP STATION VENTILATION SYSTEM
			Y	PTI-030P-01	INTAKE PUMP STATION HVAC	INTAKE PUMP STATION VENTILATION SYSTEM
031	AIR CONDITIONING	S	Y	AB-031D-01	AIR BALANCE	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL
		S	Y	AB-031G-01	AIR BALANCE	CONTAINMENT VENTILATION SYSTEM
		S	Y	AB-031P-01	AIR BALANCE	CONTROL BUILDING VENTILATION SYSTEM
		S	Y	AB-031P-02	AIR BALANCE	CONTROL BUILDING VENTILATION SYSTEM
		S	Y	AB-031R-01	AIR BALANCE	CONTROL BUILDING VENTILATION SYSTEM
		S	Y	PTI-031A-01	AUX BLDG CHILLED WATER	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL
		S	Y	PTI-031C-01	SHUTDOWN BOARD ROOM CHILLED WATER	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL
		S	Y	PTI-031D-01	SHUTDOWN BOARD ROOM ELECTRICAL	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
		S	Y	PTI-031E-01	480V BOARD ROOM HVAC ELECTRICAL	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL
		S	Y	PTI-031F-01	PASS VENTILATION BOUNDARY TEST	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL
		S	Y	PTI-031F-02	PASS VENTILATION ELECTRICAL TEST	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL
		S	Y	PTI-031F-03	PASS VENTILATION FILTER TEST	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL
		S	Y	PTI-031G-01	INCORE INSTR RM VENTILATION & CHILL	CONTAINMENT VENTILATION SYSTEM
		S	Y	PTI-031M-01	MAIN CONTROL ROOM CHILLED WATER	CONTROL BUILDING VENTILATION SYSTEM
		S	Y	PTI-031N-01	BOARD ROOM CHILLED WATER ELECTRICAL	CONTROL BUILDING VENTILATION SYSTEM
		S	Y	PTI-031P-01	MAIN CONTROL ROOM HVAC ELECTRICAL	CONTROL BUILDING VENTILATION SYSTEM
		S	Y	PTI-031P-01	MAIN CONTROL ROOM HVAC ELECTRICAL	CONTROL BLDG VENTILATION SYSTEM
		S	Y	PTI-031P-02	MAIN CONTROL ROOM HVAC FILTER	CONTROL BUILDING VENTILATION SYSTEM
		S	Y	PTI-031P-02	MAIN CONTROL ROOM HVAC FILTER	CONTROL BLDG VENTILATION SYSTEM
		S	Y	PTI-031P-03	MAIN CONTROL ROOM HVAC PRESSURE	CONTROL BUILDING VENTILATION SYSTEM
			Y	PTI-031Q-01	ELECT BOARD ROOM HVAC ELECT TEST	
		S	Y	PTI-031Q-01	ELECT BOARD ROOM HVAC ELCT TEST	CONTROL BUILDING VENTILATION SYSTEM
		S	Y	WB-031A-01	WATER BALANCE	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL
		S	Y	WB-031C-01	WATER BALANCE	AUX BLDG VENTILATION SYS & PASF-ENVIRONMENTAL CTRL
		S	Y	WB-031G-01	WATER BALANCE	CONTAINMENT VENTILATION SYSTEM

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
		S	Y	WB-031M-01	WATER BALANCE	CONTROL BUILDING VENTILATION SYSTEM
032	CONTROL AIR SYSTEM	S	Y	PTI-032-01	CONTROL AIR	COMPRESSED AIR SYSTEM
		S	Y	PTI-032-02	LOSS OF AIR TEST	COMPRESSED AIR SYSTEM
033	SERVICE AIR SYSTEM	S*		PTI-032-02	LOSS OF AIR TEST	COMPRESSED AIR SYSTEM
035	GENERATOR COOLING SYSTEM			ATI-035-01	GENERATOR COOLING-HYDROGEN SEAL OIL SYS	
				ATI-035-02	GENERATOR COOLING-HYDROGEN GAS & CO2 SYS	
				ATI-035-03	GENERATOR COOLING-STATOR COOLING SYS	
036	FEEDWATER SECONDARY TREATMENT SYSTEM		Y	NOTE #1		
037	GLAND SEAL WATER SYSTEM		Y	NOTE #1		
038	INSULATING OIL SYSTEM			NOTE #1		
039	CO2 STORAGE, FIRE PROTECTION, & PURGING SYSTEMS	S	Y	PTI-039-01	CO2 FIRE PROTECTION	FIRE PROTECTION SYSTEM
		S	Y	PTI-039-02	CO2 STORAGE & PURGING	FIRE PROTECTION SYSTEM
040	STATION DRAINAGE SYSTEM		Y	PTI-040-01	STATION DRAINAGE	LIQUID WASTE DRAINS, COLLECTION & TRANSFER
041	LAYUP WATER TREATMENT SYSTEM	S*		NOTE #1, 7		

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
043	SAMPLING AND WATER QUALITY SYSTEM	S*	Y	PTI-043-01	POST ACCIDENT SAMPLING	POST ACCIDENT SAMPLING SYSTEM
		S*	Y	PTI-043-02	PRIMARY PLANT SAMPLING	PROCESS SAMPLING SYSTEM
		S*	Y	PTI-043-03	SECONDARY PLANT SAMPLING	PROCESS SAMPLING SYSTEM
044	BUILDING HEATING SYSTEM			NOTE #1		
046A	MAIN FEEDWATER CONTROL SYSTEM	S	Y	PTI-003A-02	FEEDWATER & STEAM GENERATOR LEVEL	INTEGRATED HOT FUNCTIONAL TEST
046B	AUXILIARY FEEDWATER CONTROL SYSTEM	S	Y	PTI-003B-05	AUX FEEDWATER PUMP/TURBINE	INTEGRATED HOT FUNCTIONAL TEST
047	TURBOGENERATOR CONTROL SYSTEM		Y	ATI-047-02	EH FLUID SYSTEM	
			Y	ATI-047-05	MAIN TURBINE TURNING GEAR	
			Y	ATI-047-07	INITIAL TURBINE ROLL TEST	
			Y	ATI-047-08	TURBINE TRIPS & PROTECTIONS	
049	BREATHING AIR SYSTEM		Y	NOTE #1		
050	HYPOCHLORITE SYSTEM			NOTE #1		
052	SYS TEST FACILITY, (SEISMIC INSTRUMENTATION)	S*	Y	PTI-052-01	LOOSE PARTS MONITORING	LOOSE PARTS MONITORING
		S*	Y	PTI-052-02	SEISMIC INSTRUMENTATION	SEISMIC INSTRUMENTATION SYSTEM

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
054	INJECTION WATER SYSTEM			NOTE #1		
055	ANNUNCIATORY & SEQUENTIAL EVENTS RECORDING SYSTEM		Y	ATI-055-01	ANNUNCIATORS & SEQUENCE OF EVENTS	
056	TEMPERATURE MONITORING SYSTEM		Y	PTI-261-04	TEMPERATURE MONITORING SYSTEM HARDWARE	COMPUTER SYSTEM
057	ASSOCIATED ELECTRICAL SYSTEMS	S		NOTE #3		
058	GENERATOR BUS COOLING SYSTEM			ATI-058-01	GENERATOR BUS COOLING	
059	DEMINERALIZED WATER & CASK DECON SYSTEM	S*		NOTE #1, 7		
061	ICE CONDENSER SYSTEM	S	Y	PTI-061-01	ICE CONDENSER SYSTEM	ICE CONDENSER
		S	Y	PTI-061-02	ICE CONDENSER ICE LOADING	ICE CONDENSER
062	CHEMICAL AND VOLUME CONTROL SYSTEM	S	Y	PTI-062-01	CVCS CHARGING & LETDOWN	CHEMICAL AND VOLUME CONTROL SYSTEM
		S	Y	PTI-062-02	BORIC ACID	CHEMICAL AND VOLUME CONTROL SYSTEM
		S	Y	PTI-062-03	NFT CHARGING & LETDOWN	CHEMICAL AND VOLUME CONTROL SYSTEM
063	SAFETY INJECTION SYSTEM	S	Y	PTI-063-01	SAFETY INJECTION SYSTEM INTEG TEST	SAFETY INJECTION SYSTEM
		S	Y	PTI-063-02	SAFETY INJECTION SYSTEM ACCUM TEST	SAFETY INJECTION SYSTEM
		S	Y	PTI-063-03	SAFETY INJECTION, CHARGING & RHR FLOW BALANCE	SAFETY INJECTION SYSTEM

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
		S	Y	PTI-063-05	SAFETY INJECTION SYS PUMP/VALVE LOGIC TEST	SAFETY INJECTION SYSTEM
		S	Y	PTI-063-06	SAFETY INJECTION SYS CHECK VLVE TESTS	SAFETY INJECTION SYSTEM
064	ICE CONDENSER CONTAINMENT		Y	PTI-064-01	LOCAL LEAK RATE TESTING	CONTAINMENT LOCAL LEAK RATE TEST
			Y	PTI-064-02	INTEGRATED LEAK RATE TEST	CONTAINMENT INTEGRATED LEAK RATE TEST
065	EMERGENCY GAS TREATMENT SYSTEM	S	Y	AB-065-01	AIR BALANCE	SECONDARY CONTAINMENT VENTILATION SYSTEM
		S	Y	PTI-065-01	EMERGENCY GAS TREATMENT	SECONDARY CONTAINMENT VENTILATION SYSTEM
		S	Y	PTI-065-02	PRESSURIZER LOOP COMPARTMENT	SECONDARY CONTAINMENT VENTILATION SYSTEM
		S	Y	PTI-065-03	EGT FILTER TEST	SECONDARY CONTAINMENT VENTILATION SYSTEM
067	ESSENTIAL RAW COOLING WATER SYSTEM	S	Y	PTI-067-01	ERCW SYSTEM TEST	ESSENTIAL RAW COOLING WATER
		S	Y	PTI-067-02	ERCW FLOW BALANCE	ESSENTIAL RAW COOLING WATER
068	REACTOR COOLANT SYSTEM	S	Y	PTI-068-01	HFT HEATUP & COOLDOWN	INTEGRATED HOT FUNCTIONAL TESTS
		S	Y	PTI-068-01	HFT HEATUP & COOLDOWN	PRESSURIZER SAFETY AND RELIEF VALVES
		S	Y	PTI-068-02	REACTOR COOLANT SYS FLOW MEASUREMENT	INTEGRATED HOT FUNCTIONAL TESTS
		S	Y	PTI-068-03	PRESSURIZER HEATER & SPRAY CONTROL	PRESSURIZER SAFETY & RELIEF VALVES
		S	Y	PTI-068-04	PRESSURIZER RELIEF TANK	PRESSURIZER SAFETY & RELIEF VALVES
		S	Y	PTI-068-08	RCS - POST HFT INSPECTION/CLEANING	INTEGRATED HOT FUNCTIONAL TESTS

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
		S	Y	PTI-068-09	REACTOR VESSEL HEAD VENT SYS	INTEGRATED HOT FUNCTIONAL TESTS
		S	Y	PTI-068-10	INADEQUATE CORE COOLING MONITORING-RVLIS	INADEQUATE CORE COOLING MONITORING SYSTEM
		S	Y	PTI-068-11	RTD CROSS CALIBRATION	INTEGRATED HOT FUNCTIONAL TESTS
		S	Y	PTI-068-12	REACTOR COOLANT PRESSURE BOUNDARY LEAKAGE	REACTOR PRESSURE BOUNDARY LEAKAGE DETECTION SYS
		S	Y	PTI-068-14	REACTOR COOLANT PRIMARY HYDROSTATIC TEST	REACTOR COOLANT SYTEM COLD HYDROSTATIC TEST
070	COMPONENT COOLING WATER SYSTEM	S	Y	PTI-070-01	COMPONENT COOLING WATER PUMP/VLV LOGIC TEST	COMPONENT COOLING WATER SYSTEM
		S	Y	PTI-070-02	COMPONENT COOLING WATER FLOW BALANCE	COMPONENT COOLING WATER SYSTEM
072	CONTAINMENT SPRAY SYSTEM	S	Y	PTI-072-01	CONTAINMENT SPRAY PUMP/VLV LOGIC TEST	CONTAINMENT SPRAY SYSTEM
		S	Y	PTI-072-02	CONTAINMENT SPRAY SYS AIR TEST	CONTAINMENT SPRAY SYSTEM
074	RESIDUAL HEAT REMOVAL SYSTEM	S	Y	PTI-074-01	RESIDUAL HEAT REMOVAL SYS	RESIDUAL HEAT REMOVAL SYSTEM
077	WASTE DISPOSAL SYSTEM	S	Y	PTI-077-01	LIQUID WASTE PROCESSING SYS	LIQUID WASTE PROCESSING SYSTEM
		S	Y	PTI-077-02	GASEOUS WASTE DISPOSAL SYS	GAS WASTE PROCESSING SYSTEM
		S	Y	PTI-077-03	LIQUID RADIOACTIVE WASTE COLLECTION	LIQUID WASTE DRAINS, COLLECTIONS & TRANSFER
		S	Y	PTI-077-04	SOLID WASTE DISPOSAL SYS	SOLID WASTE PROCESSING SYSTEM
		S	Y	PTI-077-05	RADIOACTIVE FILTER HANDLING	SOLID WASTE PROCESSING SYSTEM

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
078	SPENT FUEL PIT COOLING SYSTEM	S	Y	PTI-078-01	SPENT FUEL PIT COOLING	SPENT FUEL POOL COOLING SYSTEM
079	FUEL HANDLING AND STORAGE SYSTEM	S	Y	PTI-079-01	FUEL TRANSFER SYS	FUEL HANDLING & VESSEL SERVICING EQUIPMENT
		S	Y	PTI-079-02	FUEL HANDLING & TOOLS	FUEL HANDLING & VESSEL SERVICING EQUIPMENT
		S	Y	PTI-079-03	MANIPULATOR CRANE	FUEL HANDLING & VESSEL SERVICING EQUIPMENT
081	PRIMARY MAKEUP WATER SYSTEM		Y	PTI-081-01	PRIMARY WATER	PRIMARY MAKEUP WATER SYSTEM
082	STANDBY DIESEL GENERATOR SYSTEM	S	Y	PTI-082-01	DIESEL GENERATOR 1A	DIESEL GENERATORS
		S	Y	PTI-082-02	DIESEL GENERATOR 1B	DIESEL GENERATORS
		S	Y	PTI-082-03	DIESEL GENERATOR 2A	DIESEL GENERATORS
		S	Y	PTI-082-04	DIESEL GENERATOR 2B	DIESEL GENERATORS
		S	Y	PTI-082-05	CS DIESEL GENERATOR	DIESEL GENERATORS
083	HYDROGEN RECOMBINATION SYSTEM	S	Y	PTI-083-01	HYDROGEN RECOMBINER	COMBUSTIBLE GAS CONTROL SYSTEMS
084	FLOOD MODE BORATION SYSTEM	S	Y	PTI-084-01	FLOOD MODE BORATION	FLOOD MODE BORATION
085	CONTROL ROD DRIVE SYSTEM	S	Y	PTI-085-01	ROD CONTROL SYSTEM FUNCTIONAL TEST	ROD CONTROL SYSTEM
086	DIESEL STARTING AIR SYSTEM	S	Y	PTI-082-01	DIESEL GENERATOR 1A	DIESEL GENERATORS

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
		S	Y	PTI-082-02	DIESEL GENERATOR 1B	DIESEL GENERATORS
		S	Y	PTI-082-03	DIESEL GENERATOR 2A	DIESEL GENERATORS
		S	Y	PTI-082-04	DIESEL GENERATOR 2B	DIESEL GENERATORS
		S	Y	PTI-082-05	CS DIESEL GENERATOR	DIESEL GENERATORS
088	CONTAINMENT ISOLATION SYSTEM	S	Y	NOTE #4		CONTAINMENT ISOLATION
090	RADIATION MONITORING SYSTEM	S	Y	PTI-090-01	AREA & PROCESS DOSE RATE (SHINE) MONITORS	AREA RADIATION MONITORING SYSTEM
		S	Y	PTI-090-02	LIQUID ANALOG & STEAM LINE DOSE RATE MONITORS	PROCESS & EFFLUENT RADIATION MONITORING SYSTEM
		S	Y	PTI-090-03	STACK FLOW RATE & ISOKINETIC SAMPLE CONTROL	PROCESS & EFFLUENT RADIATION MONITORING SYSTEM
		S	Y	PTI-090-04	GAS ANALOG RAD MONITORS	PROCESS & EFFLUENT RADIATION MONITORING SYSTEM
		S	Y	PTI-090-05	AREA AIRBORNE PARTICULATE ANALOG RAD MONITORS	PROCESS & EFFLUENT RADIATION MONITORING SYSTEM
		S	Y	PTI-090-06	PARTICULATE, IODINE & AS ANALOG RAD MONITORS	AREA RADIATION MONITORING SYSTEM
		S	Y	PTI-090-07	GASEOUS TWO CHANNEL DIGITAL RAD MONITORS	PROCESS & EFFLUENT RADIATION MONITORING SYSTEM
092	NEUTRON MONITORING SYSTEM	S	Y	PTI-092-01	POWER RANGE NUCLEAR INSTRUMENTATION	EXCORE NUCLEAR INSTRUMENTATION
		S	Y	PTI-092-02	SOURCE/INTERMEDIATE RANGE NUCLR INSTRUMENTATN	EXCORE NUCLEAR INSTRUMENTATION
094	INCORE FLUX DETECTOR SYSTEM	S	Y	PTI-094-01	INCORE MOVEABLE DETECTOR	

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
099	REACTOR PROTECTION SYSTEM	S	Y	PTI-099-01	REACTOR PROTECTION SENSOR RESPONSE TIME	REACTOR PROTECTION SYSTEM
		S	Y	PTI-099-01	REACTOR PROTECTION SENSOR RESPONSE TIME	ROD CONTROL SYSTEM
		S	Y	PTI-099-02	REACTOR PROTECTION SYS RESPONSE TIME TEST	REACTOR PROTECTION SYSTEM
		S	Y	PTI-099-03	REACTOR PROTECTION SYS OPERATIONAL TEST	REACTOR PROTECTION SYSTEM
		S	Y	PTI-099-04	SAFEGUARDS SYS OPERATIONAL TEST	REACTOR PROTECTION SYSTEM
		S	Y	PTI-099-05	TURBINE RUNBACK	REACTOR PROTECTION SYSTEM
		S	Y	PTI-099-06	REACTOR PROTECTION SETPOINT VERIFICATION	REACTOR PROTECTION SYSTEM
150	CONTAINMENT DRAINS		Y	PTI-040-01	STATION DRAINAGE	LIQUID WASTE DRAINS, COLLECTION & TRANSFER
151	AUX. BUILDING DRAINS		Y	PTI-040-01	STATION DRAINAGE	LIQUID WASTE DRAINS, COLLECTION & TRANSFER
200	161/6.9KV COMMON POWER SYSTEM		Y	ATI-200-01	6.9KV COMMON POWER	
			Y	PTI-200-01	PREFERRED OFFSITE POWER	AC POWER DISTRIBUTION SYSTEM
			Y	PTI-200-02	AC AUX POWER SYSTEM SURVEY	AC POWER DISTRIBUTION SYSTEM
201	6.9KV UNIT POWER SYSTEM		Y	ATI-201-01	PREFERRED OFFSITE POWER	
202	6.9KV REACTOR COOLING PUMP POWER SYSTEM		Y	ATI-202-01	6.9KV REACTOR COOLANT PUMP POWER	
203	480V UNIT POWER SYSTEM		Y	ATI-203-01	480V UNIT POWER	

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
204	SWITCHYARD POWER SYSTEM		Y	ATI-204-01	SWITCHYARD POWER SYSTEM	
205	480V TURBINE BLDG COMMON POWER SYSTEM		Y.	ATI-205-01	480V COMMON POWER	
206	480V AUXILIARY BLDG COMMON POWER SYSTEM		Y	ATI-206-01	480V AUX BLDG COMMON POWER	
207	TURBINE BLDG COMMON MOTOR CONTROL SYSTEM		Y	NOTE #1		
208	AUXILIARY BLDG COMMON MOTOR CONTROL SYSTEM		Y	NOTE #1		
209	TURBINE BLDG MOTOR OPERATED VALVE POWER SYSTEM		Y	NOTE #1		
210	TURBINE BLDG VENT POWER SYSTEM		Y	NOTE #1		
211	6.9KV SHUTDOWN POWER SYSTEM	S	Y	PTI-211-01	6.9KV SHUTDOWN POWER	AC POWER DISTRIBUTION SYSTEM
212	480V SHUTDOWN POWER SYSTEM	S	Y	PTI-212-01	480V SHUTDOWN BOARDS 1A1-A & 1A2-A	AC POWER DISTRIBUTION SYSTEM
		S	Y	PTI-212-02	480V SHUTDOWN BOARDS 1B1-B & 1B2-B	AC POWER DISTRIBUTION SYSTEM
		S	Y	PTI-212-03	480V SHUTDOWN BOARDS 2A1-A, 2A2-A	AC POWER DISTRIBUTION SYSTEM
		S	Y	PTI-212-04	480V SHUTDOWN BDS 2B1-B, 2B2-B	AC POWER DISTRIBUTION SYSTEM
213	REACTOR MOTOR OPERATED VALVE POWER SYSTEM	S	Y	PTI-213-01	REACTOR MOTOR OPERATED VALVE POWER SYS	AC POWER DISTRIBUTION SYSTEM

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
214	CONTROL & AUXILIARY VENT POWER SYSTEM	S	Y	PTI-214-01	CONTROL & AUX VENT POWER SYSTEM	AC POWER DISTRIBUTION SYSTEM
215	DIESEL AUXILIARY POWER SYSTEM	S	Y	PTI-215-01	DIESEL GENERATOR BATTERIES & CHARGERS	DIESEL GENERATORS
		S	Y	PTI-215-02	STANDBY POWER MOTOR CONTROL CENTERS	AC POWER DISTRIBUTION SYSTEM
		S	Y	PTI-215-03	CS DIESEL GENERATOR AUX POWER	AC POWER DISTRIBUTION SYSTEM
216	FUEL AND WASTE HANDLING POWER SYSTEM		Y	NOTE #1		
217	CHEMICAL AND VOLUME CONTROL POWER SYSTEM		Y	NOTE #1		
218	LUBE OIL POWER SYSTEM		Y	NOTE #1		
219	CHLORINATION BLDG POWER SYSTEM		Y	NOTE #1		
220	MAKEUP WATER POWER SYSTEM		Y	NOTE #1		
221	480V SERVICE BLDG POWER SYSTEM		Y	ATI-221-01	480V SERVICE BLDG POWER	
222	SERVICE BLDG VENT POWER SYSTEM		Y	NOTE #1		
223	OFFICE BLDG VENT POWER SYSTEM		Y	NOTE #1		
225	CONDENSER CIRC WATER PUMPING STATION POWER SYSTEM		Y	ATI-225-01	CCW PUMP STATION POWER	

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
226	INTAKE PUMPING STATION POWER SYSTEM		Y	ATI-226-01	480V INTAKE PUMP STATION POWER	
227	TURBINE BLDG LIGHTING SYSTEM		Y	PTI-228-01	EMERGENCY LIGHTING	
228	AUXILIARY BLDG LIGHTING SYSTEM	S	Y	PTI-228-01	EMERGENCY LIGHTING	EMERGENCY LIGHTING SYSTEM
231	480V TRANSFORMER YARD POWER		Y	NOTE #1		
232	REACTOR VENT POWER SYSTEM	S	Y	PTI-232-01	REACTOR VENT POWER	AC POWER DISTRIBUTION SYSTEM
233	YARD LIGHTING SYSTEM			NOTE #5		
234	HEAT TRACE SYSTEM		Y	NOTE #3		BORON RECYCLE SYSTEM
235	120V AC VITAL POWER SYSTEM	S	Y	PTI-200-02	AC AUX POWER SYSTEM SURVEY	VITAL 120V AC POWER SYSTEM
		S	Y	PTI-235-01	125V AC VITAL POWER	VITAL 120V AC POWER SYSTEM
		S	Y	PTI-262-01	INTEGRATION SAFEGUARDS ACTUATION	VITAL 120V AC POWER SYSTEM
236	125V DC VITAL POWER SYSTEM	S	Y	PTI-236-01	125V DC VITAL POWER	DC POWER DISTRIBUTION SYSTEM
		S	Y	PTI-236-02	5TH DIESEL-125V DC VITAL POWER	DC POWER DISTRIBUTION SYSTEM
237	120V AC INSTRUMENT POWER SYSTEM		Y	NOTE #1		

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
238	120V AC PREFERRED POWER SYSTEM		Y	ATI-238-01	120V AC PREFERRED POWER	
239	250V DC POWER SYSTEM		Y	ATI-239-01	250 VOLT DC POWER	
240	48V DC POWER SYSTEM		Y	NOTE #1		
241	120V AC COMPUTER SYSTEM		Y	NOTE #1		
242	RAD MON & SAMP PWR, PROCESS & AREA RAD MON SYSTEM		Y	NOTE #3		
244	24kV POWER SYSTEM		Y	ATI-244-01	24KV POWER	
245	500kV SWITCHYARD EQUIP & CABLE TUNNEL CABLE TRAYS		Y	NOTE #8		
246	MAIN RELAY BOARDS		Y	NOTE #3		
247	24 VDC COMMUNICATIONS POWER SYSTEM		Y	NOTE #3		
248	ELECTRICAL CONTROL & RECORDING INSTRUMENT SYSTEM			NOTE #2		
249	CONDENSATE DEMINERALIZER MOTOR CONTROL CENTER		Y	NOTE #1		
251	SOUND POWERED TELEPHONE SYSTEM		Y	ATI-251-01	EMERGENCY SOUND POWERED	
252	CODE CALL, PAGING, INTERCOM, AND EVACUATION ALARM		Y	PTI-252-01	PAGING & EVACUATION ALARM	COMMUNICATION SYSTEM

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
253	MICROWAVE AND VHF RADIO SYSTEM		Y	NOTE #1		
256	SOUND POWERED PRIMARY & ALT SHTDWN COMMUNICATIONS	S	Y	PTI-256-01	SHUTDOWN SOUND POWERED COMMUNICATION	COMMUNICATION SYSTEM
257	CCTV & SECURITY SYSTEM (SAFEGUARDS - BURNS - ROE)		Y	NOTE #5	BURNS & ROE CONTRACT	
260	DATA LOGGER AND DATA ACQUISITION SYSTEM			NOTE #1		
261	PLANT PROCESS COMPUTER SYSTEM		Y	PTI-261-01	PROCESS COMPUTER HARDWARE	COMPUTER SYSTEM
			Y	PTI-261-02	PROCESS COMPUTER DATA INPUT	COMPUTER SYSTEM
			Y	PTI-261-03	PROCESS COMPUTER SOFTWARE	COMPUTER SYSTEM
			Y	PTI-261-04	TEMPERATURE MONITORING SYS HARDWARE	COMPUTER SYSTEM
			Y	PTI-261-05	PPC APPLICATION SOFTWARE	COMPUTER SYSTEM
262	LOAD SHED LOGIC SYSTEM	S	Y	PTI-262-01	INTEGRATED SAFEGUARDS ACTUATION	INTEGRATED ENGINEERED SAFETY FEATURES SYSTEM
		S	Y	PTI-262-01	INTEGRATED SAFEGUARDS ACTUATION	CONTAINMENT ISOLATION
		S	Y	PTI-262-01	INTEGRATED SAFEGUARDS ACTUATION	DIESEL GENERATORS
		S	Y	PTI-262-01	INTEGRATED SAFEGUARDS ACTUATION	AC POWER DISTRIBUTION SYSTEM
		S	Y	PTI-262-01	INTEGRATED SAFEGUARDS ACTUATION	ESSENTIAL RAW COOLING WATER
		S	Y	PTI-262-01	INTEGRATED SAFEGUARDS ACTUATION	VITAL 120V AC POWER SYSTEM

SYS #	SYSTEM DESCRIPTION	CLASS.	RG 1.68	TEST PROCEDURE	TEST TITLE	FSAR TEST SUMMARY
263	STATUS MONITORING COMPUTER SYSTEM		Y	NOTE #3		
264	TECHNICAL SUPPORT CENTER		Y	ATI-264-01	EMERGENCY RESPONSE DATA ACQUISITION	
268	PERMANENT HYDROGEN MITIGATION SYSTEM	S	Y	PTI-268-01	HYDROGEN MITIGATION	COMBUSTIBLE GAS CONTROL SYSTEM
270	TURBINE BLDG CRANES & MISCELLANEOUS			NOTE #1		
271	CONTAINMENT & AUXILIARY BLDG CRANES & MISC.	S	Y	PTI-271-01	CONTAINMENT & AUX BLDG CRANES & MISC	
280	CONDENSER TUBE CLEANING SYSTEM			ATI-280-01	CONDENSER TUBE CLEANING	
281	MAKEUP WATER TREATMENT MOTOR OPERATED VALVE POWER			NOTE #1		
999	MISC SYSTEM SUPPORTS	S	Y	PTI-999-01	OPERATIONAL VIBRATION TESTING	OPERATIONAL VIBRATION TESTING
		S	Y	PTI-999-02	THERMAL EXPANSION	THERMAL EXPANSION

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NOTES:

S* These non-safety related systems have a safety related containment isolation function.

1. These non-safety related systems will be tested using vendor testing, component testing, or special test procedures.
2. No testable components in this system.
3. Testing for this system is accomplished in PTIs/ATIs for the related system.
4. This system will be tested in PTI-262-01 and related system PTIs.
5. Security and yard lighting systems will be tested with vendor or special test procedures.
6. Fire dampers are tested by component tests in their associated subsystems.
7. These non-safety related systems have a safety related containment isolation function which will be tested in PTI-064-01.
8. This system contains Pneumatic Circuit Breakers and Motor Operated Disconnects tested by TVA Customer Services Organization.