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SB-360
T.F. B7.1.2

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. George W. Knighton, Chief
Licensing Branch 3
Division of Licensing

References: (a) Construction Permits CPPR-135 and CPPR-136, Docket Nos. 50-443 and 50-444
(b) USNRC Letter, dated April 28, 1982, "Request for Additional Information - Procedures and Test Review Branch," F. J. Miraglia to W. C. Tallman

Subject: Response to 640 Series RAIs; (Procedures and Test Review Branch)

Dear Sir:

We have enclosed responses to the subject Requests for Additional Information (RAIs) which were forwarded in Reference (b).

Responses to the following RAIs are not included with this letter but will be forwarded in the near future:

640.4, 640.5, 640.8, 640.29, 640.33, 640.36, 640.61

Also enclosed are the revised FSAR Chapter 14 pages which support the RAI responses and additional revised pages which reflect organizational changes.

The enclosed information will be included in OL Application Amendment 48.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

J DeVincentis

J. DeVincentis
Project Manager

ALL/fsf

cc with enclosure:
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B001

640.6 The initial test program should verify the capability of the offsite power system to serve as a source of power to the emergency buses. Tests should demonstrate the capability of each starting transformer to supply power (as the alternate supply) to its unit's emergency buses while carrying its maximum load of plant auxiliaries and the other unit's emergency buses (as preferred supply). Tests should also demonstrate the transfer capabilities of the unit's emergency bus feeders upon loss of one source of offsite power. These tests should be performed as early in the test program as the availability of necessary components allows. Provide descriptions of the tests that will demonstrate these capabilities.

RESPONSE: The initial test program will verify the capability of the offsite power system to serve as a source of power to the emergency buses. The test program will demonstrate the capability of each transformer to supply power to the emergency buses while carrying its maximum load of plant auxiliaries. Seabrook design does not include interconnections between units, therefore, no testing will be preformed in conjunction with the other unit's emergency buses. The test program will demonstrate the transfer capabilities of the unit's emergency bus feeders upon loss of one source of offsite power.

Table 14.2-3 item 30 will be revised to include this testing.

640.7 Testing in conformance with Regulatory Guide 1.41 must incorporate the following:

1) Provide assurance that all sources of power supply to vital buses are capable of carrying full accident loads. If some portions of the power supplies cannot be full-load tested, provide justification.

2) Verify that testing is conducted with only one power source at a time.

3) Verify that buses not under test are monitored to verify absence of voltage.

<u>RESPONSE</u>: 1) Testing will demonstrate the safety related inverters are capable of carrying full accident loads while being supplied by all sorces of power (Table 14.2-3 item 32).

2) During the loss of offsite power tests (Table 14.2-3 item 39) testing will be conducted with both diesel generators started simultaneously and with each diesel generator started separately and operated independently. The test abstract will be revised to state this.

3) During the loss of offsite power tests (Table 14.2-3 item 39) the buses not under test will be monitored to verify the absence of voltage. The test abstract will revised to state this.

640.9 Verify that open and reclosure setpoints for all code safety and relief valves are checked at temperature.

RESPONSE: Verification of pressurizer and main steam safety valve lift settings (as defined by Technical Specifications) will be conducted during Intergrated Hot Functional Tests (Table 14.2-3 item 40). This testing will be conducted at hot conditions.

640.10 Review of licensee event reports disclosed that some instrumentation drift problems are due, in part, to extremes of local temperature and humidity. Provide a description of the inspections or tests that will be performed to minimize setpoint drift due to local temperature and humidity extremes.

RESPONSE: The location of instrumentation is determined with consideration of the environment (local temperature and humidity). During preoperational testing adequate ventilation and/or cooling is demonstrated to maintain system or building design requirements. These tests are described in Table 14.2-3 items 22, 28 and 29, Table 14.2-4 items 23, 24, 25, and Table 14.2-5 item 46. It is not expected that local temperature and humidity extremes will cause instrument drift problems; however, should instrument drift problems reoccur for a specific instrument, the local environment for that instrument will be inspected for temperature and humidity extremes.

640.11 Identify any of the post-fuel Loading tests described in Section 14.2.12, Table 14.2-5 which are not essential towards the demonstration of conformance with design requirements for structures, systems, components. Plant features that meet any of the following criteria should be tested:

1) Will be relied upon for safe shutdown and cooldown of the reactor under normal plant conditions and for maintaining the reactor in a safe condition for an extended shutdown period.

2) Will be relied upon for safe shutdown and cooldown of the reactor under transient (infrequent or moderately frequent events) conditions and postulated accident conditions, and for maintaining the reactor in a safe condition for an extended shutdown period following such conditions.

3) Will be relied upon for establishing conformance with safety limits or limiting conditions for operation that will be included in the facility technical specifications.

4) Are classified as engineered safety features or will be relied upon to support or assure the operation of engineered safety features within design limits.

5) Are assumed to function or for which credit is taken in the accident analysis for the facility (as described in the Final Safety Analysis Report).

6) Will be utilized to process, store, control or limit the release of radioactive materials.

<u>RESPONSE</u>: The following three tests are not considered to be essential in demonstrating conformance with the requirements shown in Regulatory Guide 1.68 REV. 2, C.1.a through C.1.f:

A. ST-40, NSSS Acceptance Test.

B. ST-48, Turbine Generator Startup Test.

C. ST-49, Circulating Water System Thermal-Hydraulic Test.

640.12 Our review of licensee event reports has disclosed that many events have occurred because of dirt, condensed moisture, or other foreign objects inside instruments and electrical components (e.g., relays, switches, breakers). Describe any tests or inspections that will be performed or any administrative controls that will be inplemented during your initial test program to prevent component failures such as these at your facility.

<u>RESPONSE</u>: The conduct of the test program (Section 14.2.4) is described in the Preoperational Test Program Description. The administrative controls of this program require construction to be essentially complete on a system and individual components to be tested and/or inspected prior to the performance of the preoperational or acceptance test being performed. It is expected that this testing program should demonstrate such component failures identified in RAI 640.12 do not exist.

640.13 Containment Combustible Gas Control System Test (PT 25). Demonstrate the following:

(1) the capability of the Combustible Gas Control System to operate in response to post-LOCA requirements,

(2) that post-LOCA hydrogen monitors function properly,

(3) the operability of the vacuum breakers.

<u>RESPONSE</u>: The three components of the Combustible Gas Control System, (Hydrogen Recombiners, Hydrogen Analyser, and Backup Purge System) will be tested during the performance of PT-25. During the performance of PT-25, the hydrogen recombiner will be operationally checked to demonstrate proper operation of its control and monitoring functions. The air flow through the recombiner will be demonstrated to be at least 100 scfm. The heatup portion of the test will demonstrate that the recombiner has sufficient power to achieve recombination temperature (1225° F). During the performance of PT-25, the Hydrogen Analyser will be operationally checked to demonstrate proper operation of its control, monitoring and alarm functions. Proper flow paths will be checked. The Hydrogen Analyser calibration will be confirmed by introduction of Reagent and Calibration gases. There are no vacuum breakers on the containment to be operationally checked. During the performance of PT-25, that portion of the Backup Purge System not previously demonstrated operable by PT-23 (Containment Enclosure Exhaust System Test) will be operationally checked. Compressed air flow to the containment will also be demonstrated operable.

Components of the CGCS located within the containment are protected against damage from internally generated missiles or jet impingement in the post-LOCA environment. Moreover, such components have been subjected to qualification tests to demonstrate their capability to remain operable in the LOCA environment for as long as may be required.
(reference FSAR Subsection 6.2.5.1.e)

640.14 Solid Radwaste System Test (AT 17). Modify the acceptance criterion to require that there be no free liquid in the solidfication sample or provide technical justification for not including this criteria.

RESPONSE: The waste solidfication system for Seabrook has not yet been purchased nor has a specification been written. It is not appropriate to respond to this request at this time.

640.15 Our review of recent Licensee event reports disclosed that a significant number of reported events concerned the operability of hydraulic and mechanical snubbers. Provide a description of the inspections or tests that will be performed following system operation to ensure that snubber operation is adequate. These inspections or tests should be performed preoperationally or, if the system for which the snubbers are being inspected will not be subjected to significant transients prior to fuel loading, then inspections should be conducted following the startup transient tests.

RESPONSE: Snubber installation and operability verification is discussed in section 3.9(B).3.4.d (Amendment 44).

640.16 Review of licensee event reports disclosed that a number of sensing lines were rendered inoperable due to being frozen and/or blocked with crud, dirt and entrapped gas. Provide a description of the inspections or tests that will be performed to ensure that the sensing lines are clear prior to utilization.

<u>RESPONSE</u>: During the flushing program instrument sensing lines will be flow tested to verify correct installation, continuity, and freedom from obstruction. Instrument performance is further verified by cross channel checks of similar instruments reading the same parameter.

640.17 Containment Spray System Test (PT-12). Verify that paths for the air flow test of containment spray nozzles overlap the water-flow test paths of the pumps to demonstrate that there is no blockage in the flow path.

RESPONSE: The Startup Test Department will develop and perform flushing procedures to verify Containment Building Spray system piping cleanliness. The air flow test of the containment spray nozzles will overlap the water flow path of the flushing program.

640.18 Containment Air Recirculating System Test (PT 26). Verify that the containment recirculation fan motor current is within its design value at conditions representative of accident conditions. Address such issues as air density, temperature, humidity, fan speed, and blade angle.

RESPONSE: The containment structure recirculation filter system (CSRFS) which is described in Subsection 9.4.5 is the only portion of the containment air recirculating system that is designed to operate in a post - LOCA environment.

Following a LOCA, the fans take suction from the apex of the dome and discharge below the operating floor. The fans, the dampers, and the suction and discharge ductwork are capable of withstanding the physical, chemical and radiological environment to which they will be subjected in the event of a LOCA. These components have been subjected to qualification tests to demonstrate their capability to remain operable in the LOCA environment for as long as may be required.
(Reference FSAR Subsection 6.2.5.1 - e)

640.19 Verify that tests of sampling systems are adequate to verify flow paths, holdup times, and procedures.

<u>RESPONSE</u>: Flow paths from each sample source per Table 9.3-1 will be verified during the performance of AT-10 (Table 14.2-4, item 10). Holdup times for the sample lines from Reactor Coolant Loops 1 & 3 will be verified during the performance of AT-10 and a change to Test Abstract AT-10 will be incorporated to reflect the required verification of holdup times. AT-10 will incorporate the plant operating procedure to the extent necessary to verify that the operating procedure is adequate.

640.20 Provide a preoperational test description to test containment penetration coolers. On those penetrations where coolers are not used, provide a startup test description that will demonstrate that concrete temperatures surrounding hot penetrations do not exceed design limits.

<u>RESPONSE</u>: Containment penetration coolers are not used at Seabrook. During the startup test program, temperture data will be collected from the concrete surrounding the hot penetrations. This data will be compared to expected values to verify that design limits are not exceeded. (Table 14.2-3 item 40).

640.21 Provide a commitment to include in your test program any design features to prevent or mitigate anticipated transients without scram (ATWS) that may now, or in the future, be incorporated into your plant design.

RESPONSE: Any design features to prevent or mitigate ATWS will be tested at such time as they are incorporated into the Seabrook Station design.

640.22 Describe the status of the power supplies to the "other" unit to ensure independence during power distribution testing. The descriptions should address both normal and emergency A.C. and D.C. power distribution systems. Provide assurance that crossties will not exist which could cause loss of emergency bus power to one unit due to testing of the other unit.

RESPONSE: There are no crossties or interconnections in the electrical distribution system between units at Seabrook, therefore, the status of the power supplies of one unit will not be affected by the other unit.

640.23 ECCS Performance Test (PT 8). Include the following for the low and high pressure safety injection, cold condition, flow tests:

1) Demonstrate that adequate margins exist between pump motor trip points and maximum operating conditions for all pump motors.

2) Demonstrate the adequacy of the electrical power supply by testing under maximum startup loading conditions.

<u>RESPONSE</u>:

1) During the ECCS performance testing (Table 14.2-3 item 8) current readings from the centrifugal charging pumps, safety injection pumps, and residual heat removal pumps will be obtained during full design flow conditions and compared with actual pump motor trip points to demonstrate that adequate margins exist.

2) Demonstration of the adequacy of the electrical power supply under maximum startup loading conditions will be conducted during loss-of-offsite power testing (Table 14.2-3 item 39) and AC electrical distribution testing (Table 14.2-3 item 30).

640.24 ECCS Hot Functional Test (PT9) include the following:

1) Expand the test prerequisites to include those listed in regulatory Guide 1.79, regulatory position C.1.c. (2).

2) In the exception to position C.1.a (2) (Page 14.2-8) reference "Other Tests" which will demonstrate the integrated system response to an actuation signal.

RESPONSE: The ECCS Hot Functional Test, PT9, in and of itself does not provide complete ECCS Testing. Several tests are combined to provide comprehensive ECCS operational testing. The ECCS performance test, PT8, (Table 14.2-3 item 8), the safety injection Accumulator Blowdown Test, PT10, (Table 14.2-3 item 10), the containment recirculation sump operability demonstration, PT11, (Table 14.2-3 item 11), and the ESF Integrated Actuation Test, PT38, (Table 14.2-3 item 38), are supplemental tests which when combined with the ECCS Hot Functional Test PT9 provide comprehensive ECCS testing. All prerequisites, as identified in Regulatory Guide 1.79 with the exceptions as described in section 14.2, are verified during the performance of the previously identified tests.

640.25 In Section 14.2.3 verify that the completion of the required preoperational testing that is required prior to fuel loading includes review and approval of test results. If portions of any preoperational tests are intended to be conducted, or their results approved, after fuel loading:

1) List each test.

2) State what portions of each test will be delayed until after fuel loading.

3) Provide technical justification for delaying these protions.

4) State when each test will be completed (key to test conditions defined in Chapter 14).

Note that any test that you do not intend to begin prior to fuel loading should be included in your startup test phase instead of the preoperational test phase.

RESPONSE: Completion of the required preoperational testing that is required prior to fuel loading includes review and approval of test results. Section 13.5.1.2 will be revised to include that approval of test results is required for all preoperational tests (except AT-17) prior to fuel loading.

Waste Solidification System Test, AT-17, (Table 14.2-4 item 17) may be performed after fuel loading. This may be required if a Waste Solidfication System is not installed in Seabrook at the time of fuel loading. The system will be tested subsequent to installation independent of the startup test program. If during the course of the Preoperational Test Program it becomes necessary to delay a portion of a preoperational test until after core load, such tests will be incorporated into the Startup Test Program. The justification for such a delay will be provided at that time.

640.26 Safety Injection Accumulator Blowdown Test (PT 10). Modify the existing abstract or provide additional tests that will demonstrate the operability of the accumulator check valves at higher-than-ambient temperatures in accordance with Regulatory Guide 1.79, Position C.1.c(3).

RESPONSE: The operability of the accumulator check valves at higher than ambient temperature will be demonstrated during the ECCS Hot Functional Test, PT-9, (Table 14.2-3 item 9) when the plant conditions satisfy the test requirment.

640.27 Include a description of the test(s) (Table 14.2-3) that will be performed to ensure conformance to Regulatory Guide 1.95 Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release. (NOTE: for a Type 1 control room, refer to Positions C.1, C.2, C.3a and C.4-6.)

RESPONSE: As explained in section 1.8 the plant design does not include the storage of chlorine within 100 meters of the control room, excluding small laboratory quantities, nor is there chlorine stored in excess of the maximum allowable chlorine inventory; therefore, no additional testing is required to be performed to ensure conformance to Regulatory Guide 1.95.

Control room ventilation testing will be performed (Table 14.2-3 item 28). Included in this testing will be the "Control room envelope" boundary seals to maintain the required positive pressure. This test will meet Regulatory Guide 1.95, Regulatory Position C.5 for measuring gross leakage characteristic of the control room.

640.28 Diesel Generators Test (PT 33). The test is presented in insufficient detail to assure the staff that Positions C.2a and C.2b of Regulatory Guide 1.108 will be satisfied. Modify Table 14.2-3 (test abstracts) and Section 1.8, accordingly.

RESPONSE: The positions of C.2a and C.2b of Regulatory Guide 1.108 will be satisfied with the exception of position C.2a(5) as discussed in section 1.8.

Diesel generator testing (Table 14.2-3 item 33) and loss of offsite power testing (Table 14.2-3 item 39) will be revised to provide sufficient detail to assure the positions will be satisfied.

640.30 Instrument and Service Air System Test (PT 12). Perform the following:

1) Expand the test prerequisites to encompass those cited in Regulatory Guide 1.80, Preoperational Testing of Instrument Air Systems.

2) Include testing of the components and systems referred to in Regulatory Guide 1.80, Sections C.2-C.7.

3) Identify the systems that are dependent on service air and are to be tested and those that are not going to be tested. To ensure conformance with Regulatory Guide 1.80, provide the following:

a) Sufficiently detailed test abstracts for those systems, dependent on air, that are to be tested.

b) Sufficiently detailed technical justifications for not testing any systems that are dependent on air.

RESPONSE:

1) AT-12, Instrument and Service Air Systems Test will satisfy the prerequisites required by Regulatory Guide 1.80.

2) AT-12 will comply with Regulatory Guide 1.80 sections C.2-C.7.

3a) No systems supplied by service air will be tested by AT-12.

3b) Service air provides air for the following systems:

Auxiliary Steam: Air is supplied to atomize fuel for the auxiliary boilers during startup of the boilers from cold conditions and to prevent furnace gases from escaping when the viewports are opened. The auxiliary steam system does not provide any safety related functions and will not be tested by AT-12.

Hot Water Supply: Air is supplied to pressurize the compression tanks in building hot water heating systems. the HWS system is not a consumer of air so loss of service air will not mean immediate loss of pressure in the compression tanks. The HWS system equipment is adequately protected from loss of compression tank pressure by interlocks and alarms which will be tested during HVAC testing. This system will not be tested by AT-12.

Combustible Gas Control:

Service air provides makeup air to containment during operation of the Backup Purge System. This capability will be demonstrated by PT-25 Containment Combustible Gas Control System Test and will not be tested by AT-12.

640.31 Shutdown from Outside the Control Room Test (ST 33). Modify the test prerequisites to include those set forth in Regulatory Guide 1.68.2, Initial Startup Test Program to demonstrate remote shutdown capability for Water-Cooled Nuclear Power Plants.

<u>RESPONSE</u>: FSAR Section 14.2.7, "Conformance of Test Programs with Regulatory Guides", Regulatory Guide 1.68.2 rev.1 states that "The remote shutdown capability of Seabrook Station will be demonstrated in accordance with the intent of Regulatory Guide 1.68.2". The prerequites listed in the Regulatory Guide will be included in test procedure ST 33.

640.32 (14.2.7) Conformance of Test Programs with Regulatory Guides, Regulatory Guide 1.128 (page 14.2-9). Reference is made to FSAR Subsections 8.3.2 and 8.3.3 for a detailed discussion of the utility's position on Regulatory Guide 1.128, Installation Design and Installation of Large Lead Storage Batteries for Nuclear Power Plants. Indicate the degree of compliance with General Criteria 1 and 17 of Appendix A and Criteria III of Appendix B in Subsection 8.3.2.2a and the degree of compliance to IEEE Std. 484-1975 in Subsection 8.3.2.2c.

RESPONSE: The response to RAI 430.31 (Attached) states that the design of the Seabrook dc system is in conformance with IEEE 484-1975 and Regulatory Guide 1.128 (Revision 1).

The latest issue of the Standard Review Plan for Section 8.3.2 of the FSAR does not indicate that General Design Criterion 1 of Appendix A is applicable to Section 8.3.2; therefore, Section 8.3.2 does not address GDC 1. However, Section 3.1.1.1 of the FSAR describes how the overall design of the Seabrook plant complies with GDC 1 of Appendix A.

Compliance with General Design Criterion 17 of Appendix A is discussed in Section 8.3.2.2.a.2 of the FSAR.

Chapter 17 of the FSAR addresses the Seabrook QA Program and compliance with 10CFR50 Appendix B. Since the QA Program covers all aspects of the plant construction and design, no specific statements on 10CFR50 Appendix B are needed in Section 8.3.2. Furthermore, the latest SRP does not include Criteria III of Appendix B in the acceptance criteria and guidelines for FSAR Section 8.3.2.

430.31 Describe how the Seabrook design meets the guidelines of IEEE Standard 484-1975 and Regulatory Guide 1.128.

RESPONSE: The design of the Seabrook dc system is in conformance with IEEE Standard 484-1975 and Regulatory Guide 1.128 (Rev. 1).

640.34 Conformance of test programs with Regulatory Guides, Regulatory Guide 1.52, Rev. 2 (page 14.2-5). Either upgrade the technical specifications and appropriate test descriptions involving the control room air cleaning system from non-ESF to ESF or provide additional technical justification for considering this a non-ESF test.

RESPONSE: In the evaluation of the control room air conditioning and ventilation systems, the NRC (AEC) staff, on pages 9-12 and 9-13 of the Seabrook Station, Units 1 & 2, Safety Evaluation Report for the PSAR dated August 14, 1974, makes the following statement:

> "Based on our evaluation and failure analysis, we have determined that the design of the air conditioning and ventilation system contains sufficient component redundancy and physical separation to meet the single failure criteria so that air conditioning and ventilation will be assured during all assumed operating conditions."

The staff then concludes with the following:

> On the basis of our review of the design criteria and bases, we conclude that the control room ventilation system functional performance will meet the habitability requirements of AEC General Design Criterion 19 during and following postulated accidents, and is acceptable."

We are revising Section 14.2.7, in Amendment 45, to add Regulatory Guide 1.140, Rev. 1, "Design, Testing and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Absorption Units of Light-Water-Cooled Nuclear Power Pumps."

For a discussion on conformance of Seabrook Station to Regulatory Guide 1.140, refer to FSAR Section 1.8.

640.35 Conformance to Regulatory Guide 1.68 (Revision 2), Item (2). It is the staff position that the requirements for systems relied on to prevent, limit or mitigate the consequences of postulated accidents be completed prior to exceeding 25% power. Modify Sections 14.2.7, 14.2.11 and the appropriate test abstracts accordingly.

<u>RESPONSE</u>: As stated in FSAR Section 14.2.7, "Conformance of Test Programs with Regulatory Guide", Regulatory Guide 1.68 REV.2, Westinghouse plants have traditionally conducted testing at 30% power. Conducting testing at 30% power allows use of this generic data base for comparison purposes.

640.37 State that copies of approved test procedures will be available for examination by NRC regional personnel approximately 60 days prior to the scheduled performance of preoperational tests, and not less than 60 days prior to scheduled fuel loading date for startup tests (NRC possession of the procedures should not impede the revision, review or refinement of the procedures), or describe the conditions that could be allowed to occur such that the procedures would not be available as planned.

<u>RESPONSE</u>: It is anticipated that copies of approved test procedures will be available for examination by NRC regional personnel approximately 60 days, prior to the scheduled performance of preoperational tests, and not less than 60 days prior to scheduled fuel loading date for startup tests. The only anticipated exceptions to the 60 days examination period would be if system design was incomplete or if the scheduled performance of the test changed such that the test had to be performed during the 60 day examination period.

640.38 Review of your precritical control rod tests indicates there is no testing of decelerating devices. Include this in your test description.

<u>RESPONSE</u>: In the Westinghouse design of the control rod, deceleration is performed in the "dashpot" region of the rod thimble. This is not an active device as such. Entry of the control rod into the dashpot region and subsequent deceleration is seen in the rod drop timing traces and will be monitored during the performance of ST 7 (Table 14.2-5, item 7).

640.39 Several items required by Regulatory Guide 1.68 for a reactor coolant system flow test have not been addressed. In addition to verifying that flow measurements are conservative with respect to the safety analysis, verify that piping reactions to transients and flows are as predicted for all modes of pump operation. If a prototype plant design is not referenced, differential pressures across the fully loaded core and major components must be measured. Confirmation that vibration levels are acceptable is also necessary.

RESPONSE: FSAR Section 14.2.7, "Conformance of Test Program to Regulatory Guides", Regulatory Guide 1.68, REV. 2, will have an exception added. The exception will read:

"Vibration levels of the reactor coolant system and piping reaction to transient conditions are measured during hot functional testing. (Appendix A, 2.f)".

640.40 Initial Criticality Test (ST 16). State that the signal-to-noise ratio of source range instrumentation (or temporarily installed detectors) will be greater than two prior to startup or provide technical justification for excluding this requirements.

<u>RESPONSE</u>: As stated in the FSAR, Seabrook Station will comply with Regulatory Guide 1.68 rev.2, with exceptions as noted. The signal to noise ratio of source range instrumentation will be greater than two prior to startup.

640.41 Commit to verifying that adequate shutdown margin exists with the greatest worth rod-cluster control assembly (RCCA) stuck out of the core while performing control rod worth measurements (ST 20).

RESPONSE: The definition of shutdown margin shown in the Technical Specifications explicity assumes that the RCCA with the greatest worth is stuck out of the core. Seabrook Station will comply with the Technical Specificiation requirements for shutdown margin during the performance of control rod worth measurements.

640.42 The water chemistry control test adstract (ST 42) is incomplete. Include both chemical and radiochemical tests. Verify that both installed analyzers and alarm systems operate properly.

RESPONSE: The test abstract objective will be changed to read: "To demonstrate that chemical and radiochemical control and analysis systems function as described in the FSAR, and to verify that water chemistry requirements can be maintained at various plant conditions."

The acceptance criteria will be changed to read: "Control and alarm systems function as described FSAR Section 9.3.4 and water chemistry is maintained within limits established by Westinghouse SIP 5-4 and Technical Specifications 3.4.8 and 3.7.1.4. Analyzer responses agree with analyzer results."

640.43 Commit to performing your pseudo-rod-ejection test (ST 21) at greater than 10% power or provide justification for performing the test at a lower power level.

RESPONSE: Seabrook Station will perform this test at greater than 10% power in compliance with Regulatory Guide 1.68 Rev. 2. Table 14.2-5 item 21 will be revised to include this additional testing.

640.44 Incore and excore instrumentation sensitivity to a control rod misalignment must be demonstrated at both 50% and 100% power (ST 31).

RESPONSE: FSAR Section 14.2.7, "Conformance of Test Porgrams with Regulatory Guides", Regulatory Guide 1.68 Rev. 2 provides justification for not demonstration incore & excore sensitivity to control rod misalignment at 100% power. A letter from Westinghouse to the NRC (NS-CE1462, June, 1977) provides further justification for not performing this test at 100% power.

640.46 Modify the acceptance criteria of the process computer test abstract (ST 43) to include verification of performance calculations and correct process variable inputs separately rather than comparing final results.

RESPONSE: The acceptance criteria will be changed to read:

"The process computer inputs and process instrumentation agree and the related calculations are being performed correctly.

640.47 Branch steam line isolation valves must be verified as to operability and response times. Include this commitment in your main steam isolation valve closure test (ST 47).

RESPONSE: The MSIV, including the small bypass around the valve, operability and response time is demonstrated during preoperational testing. (Table 14.2-3, item 13). Response time and operability of these valves is also demonstrated in compliance with the Technical Specifications.

640.48 Specifically include primary containment and steam line tunnels in your ventilation and air conditioning test (ST 46). This test should not simply verify proper operation, but must be designed to ensure that these spaces can be maintained within design limits.

RESPONSE: As stated in the FSAR, Seabrook Station will comply with Regulatory Guide 1.68 REV.2, with exceptions as noted. The primary containment and steam line tunnels will be included in ST-46. The acceptance criteria in the ST-46 abstract states that the ventilation systems are capable of maintaining equipment space environmental conditions within the design specifications.

640.49 The exception taken to Regulatory Guide 1.68, Appendix A, Section 5.m.m., in subsection 14.2.7, part (9), is not acceptable. Either provide technical justification for the deletion of this startup test including how the proper plant response will be demonstrated during other specified transient tests, or perform the MSIV closure test at 100% power. Modify (ST 47) accordingly.

RESPONSE: FSAR Subsection 14.2.7, "Conformance of Test Programs with Regulatory Guides", Reg. Guide 1.68 rev. 2, exception 9, pg. 14.2-6, will be changed to read:

"9. As shown in FSAR subsections 15.2.3 and 15.2.4, dynamic response of the plant to a MSIV closure is bounded by the response of the plant to the turbine trip event. Plant response to a turbine trip will be demonstrated during performance of ST-38, Unit Trip from 100 Percent Power. The ability of the MSIVs to close under steam flow will be demonstrated by automatic closure of all main steam line isolation valves at 30 percent power during the performance of ST-47. (Appendix A. Section 5. m. m.) "

The abstract for ST-47 will be changed accordingly.

Review of the preoperational and acceptance test phase descriptions disclosed that the operability of several of the systems and components listed in Regulatory Guide 1.68 (Revision 2), Appendix A, may not be demonstrated by tests described in Tables 14.2-3 and 14.2-4. Expand your test descriptions to address the following items:

(1) Preoperational testing

1.a(2)(h) Reactor vessel and internals; including vent valves.

1.a(2)(i) Reactor coolant system safety valves.

1.b(1) Control Rod System Test. As a minimum address the following: control rod drive operation; operation of functions such as withdrawal inhibiting features, runback features, rod worth minimizers, withdrawal sequences; interaction of the control rod drive system and design features; failure mode on loss of power.

1.d(2) Steam line atmospheric dump valves.

1.d(3) Relief valves associated with residual or decay heat removal.

1.d(4) Safety valves associated with residual or decay heat removal.

1.d(8) Assure the absense of flow instabilities in the emergency feedwater system components, piping, or inside seam generators during normal system startup and operations.

1.d(9) Condensate storage system.

1.d(10) Emergency cooling tower.

1.e(6) Turbine stop, control, bypass, and intercept valves.

1.h(5) Cold water interlocks.

1.h.(7) Ventilation, recirculation, and filter systems to minimize radioactive release associated with postulated accidents.

1.h(8) ECCS water sources.

1.h(10) Ultimate heat sink. Verify that sources of water used for long-term core cooling are tested to demonstrate adequate NPSH (net positive suction head) and the absence of vortexing over range of basin level from maximum to the minimum calculated 30 days following LOCA.

1.i(3) Containment isolation valve leak rate tests.

1.i(4) Containment penetration leakage tests.

1.i(5) Containment airlock leak rate tests.

1.i(8) Primary and secondary containment isolation initiation logic tests.

1.i(10) Containment and containment annulus vacuum-breaker tests.

1.i(11) Containment supplementary leak collection and exhaust system.

1.i(12) Containment air purification and cleanup systems.

1.i(13) Containment inerting system.

1.i(15) Containment penetration pressurization system.

1.i(17) Secondary containment system ventilation.

1.i(18) Containment annulus and cleanup system.

1.j(7) Leak detection system for ECCS and containment recirculating spray systems located outside containment.

1.j(9) Pressure control system to contain fission product leakage.

1.j(12) Failed fuel detection system or functional equivalent.

1.j(13) Incore instrumentation.

1.j(14) Water transfer instrumentation and control.

1.j(15) Automatic dispatcher control system.

1.j(17) Feedwater heater temperature, level and bypass control system.

1.j(18) Auxiliary startup instrument tests.

1.j(20) External and internal flooding detection instrumentation.

1.j(22) Postulated accident tracking instrumentation.

1.j(23) Post-accident hydrogen monitors and analyzers.

1.j(24) Reactor control and ESF annunciators.

1.k(1) Personnel and criticality radiation monitor tests.

1.k(2) Personnel monitors and radiation survey instruments.

1.k(3) Radiation level and radioactivity concentration laboratory equipment.

1.l(6) Isolation features for ventilation systems.

1.l(7) Isolation features for liquid radwaste effluent systems.

1.m(1) Spent fuel pool cooling. As a minimum address the following: antisiphon devices, high radiation alarms, and low water level alarms.

1.m(2) Refueling equipment tests. List the equiption involved or cite system description in the FSAR. The equipment must include as a minimum: hand tools, power equipment, bridge and overhead cranes and grapples.

1.m(3) Operability and leak tests of sectonalizing devices and drains. Leak tests of gaskets or bellows in the refueling canal and fuel storage pool.

1.m(4) Dynasmic and static load testing of cranes, hoists, and associated lifting and rigging equipment.

1.m(5) Fuel transfer devices.

1.n(8) Seal water system.

1.n(10) Reactor coolant system purification and cleanup system.

1.n(14) Heating, cooling and ventilation systems for:

(a) spaces housing engineered safety features.
(b) primary containment
(d) diesel generator buildings
(e) reactor building
(f) control room habitability systems. Testing or verification of operation of the following: space temperature control; duct leakage rate; toxic chemical and smoke detection.

1.n(15) Shield cooling system.

1.n(16) Refueling water storage tank cooling and heating systems.

1.n(18) Heat tracing and freeze protection systems.

1.o(1) Reactor components handling systems dynamic and static load tests.

1.o(2) Reactor components handling systems protective devices and interlock operability tests.

1.o(3) Reactor components handling system safety device operability tests.

RESPONSE:

1.a(2)(h) Operability of the reactor vessel and internals will be demonstrated during reactor post-hot functional inspection (Table 1'.2-3 item 43) and as described in Section 3.9(N).2.4. There are no reactor internals vent valves in the Seabrook design.

1.a(2)(i) Operability of the reactor coolant system safety valves will be demonstrated during integrated hot functional testing (Table 14.2-3 item 40 section h).

1.b(1) Operability of the control rod drive system will be demonstrated during control rod drive mechanism operational testing (Table 14.2-5 item 5), rod control system testing (Table 14.2-5 item 6), rod drop time measurement testing (Table 14.2-5 item 7), rod position indication testing (Table 14.2-5 item 8), and automatic reactor control testing (Table 14.2-5 item 24).

1.d(2) The operability of the steam line atmospheric dump valves will be demonstrated during heat up to hot functional testing (Table 14.2-3 item 41).

1.d(3) Operability of the relief valves associated with the residual heat removal system will be demonstrated prior to system operation during Phase 1 testing. (Table 14.2-3 item 7).

1.d(4) Seabrook design does not include safety valves associated with the residual heat removal system.

1.d(8) Flow instability testing will be conducted during PT-14 (Table 14.2-3 item 14).

1.d(9) The operability of condensate storage system with regards to the emergency feedwater system will be demonstrated during the emergency feedwater system test (Table 4.2-3 item 14).

1.d(10) The operability of emergency cooling towers will be demonstrated during the service water system test, PT-15, (Table 14.2-3 item 15).

1.e(6) The operability of the turbine stop, reheat and intercept valves will be demonstrated during the initial turbine roll, (Table 14.2-3 item 40.g.) The operability of the turbine bypass valves will be demonstrated during hot functional testing (Table 14.2-3 item 40 Section i).

1.h(5) Seabrook does not have any cold water interlocks. Power operation mode requires all four RCP's to be operating, therefore, cold water interlocks are not required nor tested.

1.b(7) Ventilation, recirculation, and filter systems to mimimize radioactive releases as a result of postulated accidents will be verified during the containment enclosure exhaust system test (Table 14.2-3 item 23) and the fuel storage building ventilation system test (Table 14.2-3 item 27).

1.h(8) The operability of ECCS water sources will be demonstrated during the ECCS performance test (Table 14.2-3 item 8).

1.h(10) Cooling Tower performance will be verified during the service water system test (Table 14.2-3 item 15). The ability to provide tower makeup water as discussed in subsection 9.2.5.3c will also be verified.

1.i(3) Containment isolation valve leak rate testing will be conducted during the primary containment leak rate tests (Table 14.2-3 item 37).

1.i(4) Containment penetration leakage tests will be conducted during the primary containment leak rate tests (Table 14.2-3 item 37).

1.i(5) Containment airlock leak rate tests will be conducted during the primary containment leak rate tests (Table 14.2-3 item 37).

1.i(8) Primary containment isolation initation logic tests will be conducted during primary containment isolation valve testing (Table 14.2-3 item 21).

The Containment Enclosure Building (secondary containment) does not include an isolation feature as such, however, the containment enclosure exhaust equipment will initiate upon receipt of an ESF actuation feature signal. This feature is tested during the containment enclosure exhaust system testing (Table 14.2-3 item 23).

1.i(10) Containment vacuum - breakers are not used at Seabrook.

1.i(11) Containment supplementary leak collection system will be tested during liquid waste system testing (Table 14.2-4 item 15) by verifying the operation of the containment sump pumps and their ability to transfer water to the liquid waste system.

The containment exhaust system will be tested during containment purge system testing (Table 14.2-4 item 22).

1.i(12) Containment air recirculation system (described in subsection 9.4.5) will be tested during the containment air recirculation system tests (Table 14.2-3 item 26).

1.i(13) Containment inerting system is not used at Seabrook.

1.i(15) Containment penetration pressurization system is not used at Seabrook.

1.i(17) The containment enclosure ventilation system (described in subsection 9.4.6) will be tested during the containment enclosure ventilation test (Table 14.2-3 item 22).

1.i(18) Containment annulus and cleanup system is not used at Seabrook. The containment air recirculation system (described in subsection 9.4.5) will be tested during the containment air recirculation system test (Table 14.2-3 item 26).

1.j(7) Leak detection systems used to detect failures in ECCS and containment recirculating spray systems located outside the containment are not used at Seabrook.

1.j(9) Pressure control systems used to maintain design differential pressures to prevent leakage across boundaries provided to contain fission products are not used at Seabrook

1.j(12) Systems that provide indication of failed fuel, as specified in FSAR section 11.5.2.1.g, will be tested by AT-30 (Table 14.2-4 item 30).

1.j(13) Incore and excore neutron instrumentation will be tested during the movable incore detector system test (Table 14.2-5 item 50) and the excore nuclear instrumentation test (Table 14.2-3 item 18).

1.j(14) Instrumentation and controls that effect transfers of water supplies to emergency feedwater pumps, ECCS pumps, and containment spray pumps will be demonstrated operable during the systems tests (Table 14.2-3 items 14, 8 and 12 respectively).

1.j(15) Automatic dispatcher control systems are not used at Seabrook.

1.j(17) Feedwater heater temperature, level and bypass control systems will tested during extraction steam and heater drain system test (Table 14.2-4 item 2).

1.j(18) Auxiliary startup instrument systems will be tested prior to initial core loading. Completion of this testing will be identified in the test procedure for initial core prerequisites (Table 14.2-5 item 3).

1.j(20) Containment sump level monitoring system is used to detect flooding conditions that could result from such sources as fluid system piping failures, the containment sump level monitoring system will be demonstrated operational by performance of a channel calibration in accordance with technical specifications.

1.j(22) Accident monitoring instrumentation (as described in RG 1.68 Rev. 2, 1.j(22)) will be demonstrated operable in accordance with technical specification 4.3.4.6.

1.j(23) Post accident hydrogen monitors and analyzers used in the combustible gas control system will be demonstrated operable during containment combustible gas control system test (Table 14.2-3 item 25).

1.j(24) Annunciators for reactor control and engineered safety features will be demonstrated operable during computer testing (Table 14.2-4 item 28).

1.k(1) Process, criticality effluent and area radiation monitors will be demonstrated operable during radiation monitoring system testing (Table 14.2-4 item 30).

1.k(2) Personnel monitors and radiation survey instruments will be demonstrated operable in accordance with section 12.5. The procedures described in section 12.5 will be implemented prior to core loading.

1.k(3) Laboratory equipment used to analyze or measure radiation levels and radioactivity concentrations will be demonstrated operable in accordance with section 12.5. The procedures described in section 12.5 will be implemented prior to core loading.

1.l(6) Isolation features for radioactive waste handling and storage area ventilation systems are not used at Seabrook.

1.l(7) Isolation features for liquid radwaste effluent systems will be demonstrated operable during liquid waste system test (Table 14.2-4 item 15).

1.m(1) Spent fuel pit cooling features will be demonstrated operable during spent fuel pool cooling system test (Table 14.2-3 item 17).

1.m(2) Refueling equipment will be demonstrated operable during fuel handling and transfer equipment system tests (Table 14.2-3 item 34).

1.m(3) Operability and leak tests of sectionalizing devices in the refueling canal and fuel storage pool will be demonstrated operable during spent fuel pool cooling system test (Table 14.2-3 item 17).

1.m(4) The test abstract for fuel handling and transfer equipment (Table 14.2-3 item 34) will be revised to require dynamic and static load testing, as a prerequisite to performing PT-34.

1.m(5) Fuel transfer devices will be tested during fuel handling and transfer equipment system test (Table 14.2-3 item 34).

1.n(8) Reactor coolant pump seal water system will be demonstrated operable during chemical and volume control system (charging and letdown) test (Table 14.2-3 item 5).

1.n(10) Purification and clean-up systems for the reactor coolant system will be demonstrated operable during chemical and volume control system (charging and letdown) test (Table 14.2-3 item 5).

1.n(14)(a) Heating, cooling, and ventilation systems will be demonstrated operable for spaces housing engineered safety features during the performance of the engineered safety features system or during the performance of a specific ventilation test (e.g., emergency feedwater system test (Table 14.2-3 item 14), service water system test (Table 14.2-3 item 15), Containment enclosure ventilation system (Table 14.2-3 item 22), emergency switchgear ventilation (Table 14.2-3 item 29), primary auxiliary building ventilation system (Table 14.2-4 item 23) and electrical penetration area air conditioning system (Table 14.2-4 item 24)).

1.n(14)(b) Primary containment cooling will be demonstrated operable during the containment cooling system test (Table 14.2-4 item 21).

1.n(14)(d) Diesel generator building ventilation will be demonstrated during the diesel generator test (Table 14.2-3 item 33).

1.n(14)(e) Reactor building (containment) cooling will be demonstrated operable during the containment cooling system test (Table 14.2-4 item 21).

1.n(14)(f) Control room habitability system is described in section 6.4. Operability of the control room habitability system will be demonstrated during control room HVAC system test (Table 14.2-3 iter 28).

1.n(15) Shield cooling system is not used at Seabrook.

1.n(16) Refueling water storage tank (RWST) cooling system is not used at Seabrook. RWST heating system will be demonstrated operable during ECCS performance test (Table 14.2-3 item 8).

1.n(18) Heat tracing for the boron injection tank subsystem will be demonstrated operable during ECCS performance test (Table 14.2-3 item 8). Freeze protection will be demonstrated operable during the test of the systems that utilize freeze protection.

1.o(1) The test abstract for the polar crane (Table 14.2-4 item 35) will be revised to require dynamic and static load testing as a prerequisite to performing AT-35.

1.o(2) Operability of protection devices and interlock of the containment polar crane will be demonstrated during the polar crane test (table 14.2-4 item 35).

1.o(3) Operability of safety devices on the containment polar crane will be demonstrated during the polar crane test (Table 14.2-4 item 35).

We could not conclude from our review that you have addressed all of the startup tests required by Regulatory Guide 1.68, Rev.2. Expand your startup test abstracts or provide additional test abstracts to include the following tests shown in Appendix A.

2) Initial Fuel Loading and Precritical Tests.

2.a Shutdown margin verification.

2.c Reactor protection system final functional testing.

4) Low-Power Testing.

4.a Boron and moderator temperature reactivity coefficients.

4.j Primary containment ventilation system.

4.k Steam-driven engineered safety features

4.t Performance of natural circulation tests of the reactor coolant system to determine that design heat removal capability exists. Your natural circulation test should comply with our letter to you dated June 12, 1981. We suggest you contact Westinghouse in reference to the Westinghouse letter to the NRC dated July 8, 1981, on the subject of Special Low Power Test Program which complies with the staff position on TMI-2 Action Item I.G.1 requirement. To comply with this requirement new PWR applicants have committed to a series of natural circulation tests. To date, such tests have been performed at the Sequoyah 1, North Anna 2, and Salem 2 facilities. Based on the success of the programs at these plants, the staff has concluded that augmented natural circulation training should be performed for all future PWR operating Licenses. Include description of natural circulation tests that fulfill the following objectives:

Testing

The tests should demonstrate the following plant characteristics: Length of time required to stabilize natural circulation, core flow distribution, ability to establish and maintain natural circulation with or without onsite and offsite power, the ability to uniformly borate and cool down to hot shutdown conditions using natural circulation, and subcooling monitor performance.

Training

Each licensed reactor operator (RO or SRO who performs RO or SRO duties, respectively) should participate in the initiation, maintenance, and recovery from natural circulation mode. Operators should be able to recognize when natural recirculation has stabilized, and should be able to control saturation margin, RCS pressure; and heat removal rate without exceeding specified operating limits. If these tests have been performed at a comparable prototype plant, they need be repeated only to the extent necessary to accomplish the above training objectives and to obtain data for "fine tuning" your simulator (as stated in FSAR Subsection 13.2.1.1.b.5) for natural circulation operation.

5) Power Ascension Tests

5.d Xenon transients controls.

5.l Residual or decay heat removal system and components.

5.o Reactor coolant leak detection systems.

5.s Principal plant control systems.

5.v Main steam and feedwater systems.

5.x Auxiliary systems required to support the operation of engineered safety features.

5.c.c Gaseous and Liquid radioactive waste systems verification.

5.e.e Primary containment inerting and purge systems.

5.k.k Dynamic response due to loss of a feedwater heater.

5.o.o Vibrations and expansions of ASME Class 1, 2 and 3 systems.

RESPONSE: 2.a FSAR section 14.2.7, "Conformance of Test Programs with Regulatory Guides", Regulatory Guide 1.68 REV.2, exception 3 states that shutdown margin will be verified throughout core loading and precritical testing.

2.c Reactor Protection System (RPS) functional testing is performed as part of Technical Specifications surveillance testing. Verification of final RPS functional testing will be included as part of ST 3 (Table 14.2-5 item 3).

4.a The boron worth coefficient is determined as part of ST 17, Boron Endpoint Measurements (Table 14.2-5 item 17). The moderator temperature coefficient is determined as part of ST-18, Isothermal Temperature Coefficient Measurements (Table 14.2-5 item 18).

4.j The performance of Primary containment ventilation systems will be demonstrated during preoperational hot functional testing. (Table 14.2-3 item 26 and Table 14.2.4 item 21.

4.k The only steam driven engineered safety feature at Seabrook is one of the emergency feed pumps. Operability of this system is demonstrated during hot functional testing (Table 14.2-3 item 14) and is maintained in accordance with Technical Specifications.

4.t For the response to this item, see YAEC letter, dated November 27, 1981, "Response to Acceptance Review RAI's", J. DeVincentis to D. Eisenhut, SBN-193.

<u>RESPONSE</u>: 5.d Westinghouse report WCAP-8528 provides the results of Xenon transient control testing for prototype plants with a 12 foot active length core. Since Seabrook does not differ from this prototype design, this test will not be performed.

5.1 FSAR section 14.2.7, "Conformance of test Programs with Regulatory Guides", Regulatory Guide 1.68 Rev.2, exception 5 states that the residual or decay heat removal systems capability will be demonstrated during hot functional testing.

5.o The response of the reactor coolant leak detection system will be demonstrated during preoperational testing (Table 14.2-3 item 40) and will be in operation in accordance with Technical Specifications during the power ascension program.

5.s FSAR section 14.2.7, "Conformance of Test Programs with Regulatory Guides", Regulatory Guide 1.68 Rev.2, exception 7 specifies some of the systems that can not be testing during power ascension. Listed below are the procedure numbers that demonstrate control system performance.

ST-24;-T-average control and automatic reactor control.

PT-5.1; Charging and Letdown control.

PT-5.3; Boron Addition System.

PT-(I)-40.1 and ST-9; Pressurizer Pressure Control.

ST-25 and ST-26, Main Feedwater Control

5.v The objective of ST-26 will be changed to read:

"To obtain various primary and secondary plant temperatures, pressures, and flows in order to perform a calorimetric determination of reactor power and verify that the main steam and feed water systems perform as described in the FSAR.

The acceptance criteria of ST 26 will be changed to read:

"The data specified in the procedure has been collected and the calorimetric performed. Main Steam and Feedwater Systems operate as described in FSAR Section 10.4.7".

5.x Ventilation systems are tested during ST-46. Performance of support systems such as component cooling and service water is demonstrated during hot functional testing (Table 14.2-3 items 15 and 16).

5.c.c The operation of these systems is demonstrated during preoperational testing (Table 14.2-4 items 14 and 15).

5.e.e There is no inerting of primary containment at Seabrook. The Containment Purge system is tested during the preoperational testing phase (Table 14.2-4 item 22).

5.k.k FSAR Section 14.2.7, "Conformance of Test Programs with Regulatory Guides", Reg. Guide 1.68 rev. 2, exception 8, pg. 14.2-6 will be changed to read:

"8. A demonstation of the dynamic response of the plant to a loss of or bypassing of a feedwater heater(s) will not be performed. As shown in FSAR section 15.1.1, the transient resulting from the most severe case of feedwater temperature reduction initiated by a single failure or operator error is similar to, but of a lesser magnitude than the excessive load increase (load swing). The load swing test will be performed at several major plateaus. (Appendix A, Section 5.k.k.) "

5.o.o Vibration and expansion testing will be performed during hot functional testing (Table 14.2-3 items 3 and 4).

640.52 List the specific FSAR sections describing Acceptance Tests No. 25, 28, and 35, "Turbine Building Ventilation," "Computer", and "Polar Crane."

RESPONSE: These are non-safety related systems for which an acceptance test will be developed and performed. There is no specific FSAR section describing these tests other than Table 14.2-4, items 25, 28, and 35.

640.53 Change the table of contents title for PT 36 from "Primary Containment Structural Integrity Test" to "Primary Containment Structural Acceptance Test" in accordance with Regulatory Guide 1.18.

RESPONSE: Regulatory Guide 1.18 was withdrawn on July 8, 1981, and superseded by Regulatory Guide 1.136, Rev.2, 6/81. Regulatory Guide 1.136 endorses ASME Code for Concrete Reactor Vesels and Containments. Article CC-6000 of the Code is titled "Structural Integrity Test of Concrete Containment Structures". The present title for PT 36 is used throughout the FSAR, therefore, to reduce confusion and to be consistant with the ASME Code, the title for PT 36 will remain "Primary Containment Structural Integrity Test". Table 14.2-3 item 36 will be revised to reflect this change.

640.54 It is our position that your description of the reactor protection system test (PT 19) does not provide assurance that the total reactor protection system response time is consistent with your accident analysis assumptions. Expand the test abstract.

<u>RESPONSE</u>: The test abstract has been expanded to include the technical specification definition of reactor trip system response time.

640.55 The loss of turbine-generator and offsite power test should be initiated from a sufficient power level and should be maintained for a period of time sufficient to demonstrate that the necessary equipment, controls, and instrumentation are available following station blackout to remove decay heat from the core using only emergency power supplies. It is our position that you initiate this test from at least 100% generator output and maintain the loss of offsite power for at least 30 minutes in order to demonstrate this.

RESPONSE: Regulatory Guide 1.68 Rev. 2 (item 5.j.j.) shows the approximate range for the loss of turbine-generator coincident with loss of offsite power to be 10 to 20%. At Seabrook, this test will be done at approximately this range during the return to power following the unit trip from 100% power. The loss of offsite power will be maintained for 30 minutes.

640.56 Paginate all pages (sheet numbers are acceptable) including pages with tables, figures, and definitions for tables.

RESPONSE: Table 14.2-1, Initial Test Program Responsibility/ Authority Matrix will be revised to include sheet numbers.

640.57 Provide a corresponding page number with each test listed on the startup test abstracts page.

RESPONSE: Table 14.2-5, Startup Test Abstracts, will be revised to include the corresponding sheet number with each test listed on the index pages.

640.58 Provide a corresponding page number with each test listed on the acceptance test abstracts page.

<u>RESPONSE</u>: Table 14.2-4, Acceptance Test Abstracts, will be revised to include the corresponding sheet number with each test listed on the index pages.

640.59 Provide a corresponding page number with each test listed on the Preoperational Test Abstracts page.

<u>RESPONSE</u>: Table 14.2-3, Preoperational Test Abstracts, will be revised to include the corresponding sheet number with each test listed on the index pages.

640.60 Recently, questions have arisen concerming the operability and dependability of certain ESF pumps. Upon investigation, the staff found that some completed preoperational test procedures did not describe the test conditions in sufficient detail. Provide assurance that the preoperational test procedures for ECCS and containment cooling pumps will require recording the status of the pumped fluid, (eg., pressure, temperature, chemistry, amount of debris) and the duration of testing for each pump.

RESPONSE: During the Preoperational Test Program, all safety related pumps will be tested in accordance with ASME Section XI, Subsection IWP. This will satisfy the requirement of recording the status of the pumped fluid, except for chemistry. During the Preoperational Test Program, flushing of systems will be performed, as stated in Section 14.2.11 of the FSAR, to establish System Design Cleanliness Conditions. Once System Cleanliness has been established, it will be maintained in accordance with the system design. Additionally, during testing in accordance with ASME Section XI, Subsection IWP, the pumps will be run until stabalized conditions are obtained and pump run times are recorded for the Station IWP Program.

640.62 Our review of Licensee event reports has disclosed several instances of emergency feedwater pumps failing to start on demand, It appears that many of these failures could have been avoided if more thorough testing had been conducted during the plant's initial test programs. In order to discover any problems affecting pump startup and to demonstrate the reliability of your emergency cooling system, state your plans to demonstrate at least five consecutive, succesful, cold, quick pump starts during your initial test program.

<u>RESPONSE</u>: The test abstract for the emergency feedwater pumps (Table 14.2-3, item 14) will be revised to include a demonstration of at least five consecutive, successful, cold pump starts.

640.63 125 VDC Distribution System Test (PT 31). State your plans to verify that individual cell limits are not exceeded during the design discharge test and to demonstrate that the DC loads will function as neccessary to assure plant safety at a battery terminal voltage equal to the acceptance criterion that has been established for minimum battery terminal voltage for the discharge load test. Assure that each battery charger is capable of floating the battery within 24 hours while supplying the largest combined demands of the various steady-state loads under all plant operating conditions.

<u>RESPONSE:</u> Battery testing will be performed to verify that individual cell limits are not exceeded during the design discharge tests per IEEE Std 450-1975 in accordance with RG 1.129. PT 31 will demonstrate battery capability to meet design requirements. Individual cell voltages will be monitored by a data logger. The safety related UPS has shown static inverter operation with rated regulated ac output during factory tests with minimum battery terminal voltage (105 vdc) input. The size of the battery charger is based on restoring the battery back to fully charged state following a service discharge test while supplying the largest combined demands and hence rated at 150 amperes. 150 ampere rating was verified for each charger during factory performance testing in accordance with NEMA-PV5. In addition, each safety related permanent battery charger will be tested to demonstrate it is capable of floating the battery within 24 hours while supplying the largest combined demands of the various steady state loads under all plant operating conditions.

640.64 Integrated Plant Cooldown from Hot Functional Tests (PT 42). Expand the cooldown test to assure that adequate control and monitoring is exersised such that an overcooling transient (I.E., thermal shock) will not occur during normal or emergency cooldown modes.

RESPONSE: Test abstract for PT 42 (Table 14.2-3, item 42) will be revised to include monitoring and controlling cooldown rates. The cooldown limitation of the Technical Specifications will not be exceeded.

640.65 Certain terminology used in the individual test description does not clearly indicate the source of the acceptance criteria to be used in determining test adequacy. An acceptance format for providing acceptance criteria for test results includes any of the following:

- Referencing technical specifications (Chapter 16),
- Referencing accident analysis (Chapter 15)
- Referencing other specific sections of the FSAR (eg. 7.4.1.2),
- Referencing vendor technical manuals,
- Providing specific quantitative bounds (only if the information cannot be provided in any of the above ways).

<u>RESPONSE</u>: Individual test description abstracts will be modified to meet the requirements of RAI 640.65.

640.66 Several of the acceptance criteria do not reflect complete accomplishment of the test objectives. Modification should be made so that when the acceptance criteria has been met, the test objective will have been aschieved. Modify the individual test description abstracts presented below to provide consistency between the test objective and the acceptance criteria.

(1) PT 40. Acceptance criteria implies that all systems and all instrumentation would have to be demonstrated or operated. Objective and Test Method state a limited number.

(2) AT 31. The objective indicates a test must be performed. The acceptance criteria implies that the test has already been completed. The acceptance criteria needs to be changed to "Demonstration of the..."

(3) ST 1. Acceptance criteria needs to include the completion of a schedule or proposed test sequence.

(4) ST 3. Need to change "procedure" in the acceptance criteria to "test objective" or reference a procedure that provides a detailed list of plant conditions, systems, and equipment necessary for a safe and controlled core loading.

(5) ST 4. Objective is to develop detailed instructions for loading whereas the acceptance criteria is aimed at completion of loading and its documentation.

(6) ST 10. Acceptance criteria does not assure that the calculations outlined in the test objective were performed.

<u>RESPONSE:</u>

(1) The Aceptance Criteria of PT 40 (Table 14.2-3, item 40) will be revised.

(2) The Acceptance Criteria of AT 31 (Table 14.2-4, item 31) will be revised.

(3) The Acceptance Criteria of ST 1 (Table 14.2-5, item 1) will be revised.

(4) ST 3 is the procedure that is referenced in the acceptance criteria. ST 3 provides the de--tailed list of conditions, components, systems, ect.

(5) The Acceptance criteria of ST 4 (Table 14.2-5, item 4) will be revised.

(6) The Acceptance Criteria of ST 10 (Table 14.2-5, item 10) will be revised.

14.2 SPECIFIC INFORMATION TO BE INCLUDED IN FSAR

14.2.1 Summary of Test Program and Objectives

A comprehensive initial test program will be conducted at the Seabrook Station to demonstrate that plant systems, structures, and components will perform in a manner that will not endanger the health and safety of the public. The principle objectives of this program are to provide, to the extent practical, assurance of the following:

a. The plant has been properly designed and constructed and is capable of operating safely at performance levels specified in the FSAR, and

b. The plant operating and emergency procedures have been verified by trial use to be adequate, and

c. The plant operating and technical personnel are knowledgeable about the plant equipment and procedures and are prepared to operate the facility in a safe manner.

The initial test program will include a preoperational test phase and an initial startup test phase. Preoperational testing will consist of individual system and integrated system tests performed prior to (and in some cases after) initial core load on essentially completed systems and structures. These tests will demonstrate, to the extent practicable, the capability of systems, structures, and components to meet performance requirements.

Initial startup testing will consist of those single and multi-system activities scheduled to be performed during and following fuel loading. This will include precritical tests, initial criticality, low-power tests, and power ascension tests. This testing will demonstrate that the plant will operate in accordance with design and the ability of the plant to respond properly to anticipated transients.

14.2.2 Organization and Staffing

The Yankee Atomic Electric Company Startup Test ~~Group~~ Department will manage and provide overall direction for the initial test program. The Startup Test Group Department will consist of personnel assigned to the plant site with specialties in areas such as primary systems, secondary systems, electrical systems, and plant operations. These individuals will be assigned overall responsibility for various aspects of the test program within their areas of expertise. During the performance of system preoperational tests and initial startup tests, the Startup Test Group Department personnel will direct plant operations personnel during test activities and will be responsible for the acquisition, review and evaluation of relevant data.

Table 14.2-1 is a responsibility/authority matrix showing the various organizations involved with each portion of the Seabrook initial test program. A definition of each of the major responsibilities is provided to clarify its specific intent. This table also presents the organizations responsible for the preparation, review and approval of Preoperational, Acceptance, Startup and Special Test procedures. The responsible design organizations or vendors will provide technical support, as requested by their respective on-site organizations, and will either review or specify the acceptance criteria used in these test procedures.

The interrelationship of the various organizations during testing activities is discussed in Sections 14.2.4 and 14.2.5.

In order to insure a comprehensive overview of the preoperational test program by the appropriate organizations, a Joint Test Group (JTG) will be formed consisting of site representatives of ~~the Startup Test Group, UE&C,~~ Yankee Atomic Electric Company, United Engineers and Constructors and the Seabrook Station operating staff. The representative from ~~the Startup Test Group~~ Yankee Atomic Electric Company shall act as chairman of the Joint Test Group. When necessary, personnel from other organizations shall be invited to attend the meetings of the JTG for the purpose of information, coordination, or technical advice. The Nuclear Steam Supply System vendor (Westinghouse), the Architect-Engineer and Construction Manager (UE&C), and Yankee Nuclear Service Division will provide technical assistance in their areas of specialty as required throughout the test program.

The JTG will be responsible for the following activities:

a. Review and approval of preoperational test procedures,

b. Review and approval of changes to preoperational test procedures,

c. Review and approval of the results of preoperational tests.

At the time of the start of initial fuel loading, the JTG will be dissolved and the Station Operations Review Committee (SORC) will assume the responsibilities stated above during initial startup testing.

During this portion of the program, the appropriate vendor and design organizations will provide technical assistance during the initial procedure technical review by the Startup Test ~~Group~~ Department.

All personnel authorized to direct testing during the test program and to approve the procedures used in these tests will be appropriately qualified in accordance with the requirements of Regulatory Guide 1.58 (Revision 1, 9/80) as further clarified in Section 1.8. Personnel authorized to direct preoperational and startup tests (Phases 2 through 6) shall also meet the additional requirements of a Bachelor Degree in Egnineering or related science with a minimum of one year experience acquired in testing, operation, and maintenance of power generating facilities for the direction of preoperational tests and a minimum of two years experience for the direction of startup tests. For personnel who do not possess the formal education, this requirement may be waived where upon other factors provide sufficient demonstration of ability. Personnel assigned to the Startup Test ~~Group~~ Department shall also receive additional training in the administration and requirements of the test program. The qualifications of the station operating and technical staff are discussed in Section 13.1.

14.2.3 Test Procedures

The initial test program will be conducted using written procedures for each individual test. Tests of systems and equipment performed prior to (or in some cases after) initial core load are designated as either Preoperational Tests (PT) or Acceptance Tests (AT). Preoperational Tests will be subdivided into either of the following categories:

a. Individual Systems Tests - tests which demonstrate the proper operation of plant systems and equipment which perform a safety-related function.

b. Integrated Systems Tests - tests which involve the integrated operation of plant systems and equipment to demonstrate or verify a safety-related function.

Acceptance Tests will demonstrate the proper operation of non-safety-related plant systems and equipment.

Tests performed as part of or subsequent to loading of fuel into the reactor core are designated as Startup Tests (ST). In addition, Special Test Procedures (STP) will be used for situations which require the performance of a test for investigative or data collection purposes which are not in the original scope of the test program.

Each test specified above will contain as a minimum, the following sections:

a. Test Objectives
b. Prerequisites
c. Special Precautions
d. Initial Conditions (including environmental)
e. Test Instructions
f. Final Conditions
g. Acceptance Criteria

The Test Instructions section of the test will provide data blanks or reference data sheets which specifically identify the data to be recorded in each test. Means will be provided to identify the individuals who witness or record data during each test and the instrumentation used for data collection. Administrative procedures will be provided to specify proper methods for collection and retention of test data.

Table 14.2-1 shows the organizations responsible for the preparation, review and approval of Preoperational, Acceptance, Startup and Special Test procedures. The responsible design organizations or vendors will provide technical support, as requested by their respective on-site organizations, and will either review or specify the acceptance criteria used in these test procedures.

14.2.4 Conduct of the Test Program

The preoperational test program will be administered in accordance with the Preoperational Test Program Description which is prepared by the Startup Test ~~Group~~ and approved by the ~~Joint Test~~ Group participating organizations. Where necessary, due to certain unique activities associated with testing, administrative procedures will be prepared by the Startup Test ~~Group~~ and reviewed by the Joint Test Group; otherwise, station administrative procedures will be used as applicable during the initial test program.

The initial startup program will be administered in accordance with a startup procedure which is prepared by the Startup Test ~~Group~~ Department and approved by the Station Operations Review Committee. Normal station administrative procedures will be used during the initial startup program.

Prior to the performance of a system preoperational or acceptance test, a test engineer (or engineers) will be assigned by the Startup Test ~~Group~~ to direct the test. For startup tests, Startup Test ~~Group~~ Department engineers or appropriately qualified station staff technical personnel will be assigned test director responsibility. These individuals will be responsible for insuring that prerequisites are complete, precautions are complied with and initial conditions are established. They will then direct the station operating personnel in the performance of the test and assure all applicable data is recorded. Station operating personnel will be responsible for the safe and proper operation of the plant and its associated equipment throughout the test program. The Shift Supervisor shall take whatever action is necessary including, but not limited to, stopping any test and placing plant equipment in a safe condition.

Once a preoperational or acceptance test procedure has been approved by the Joint Test Group, all procedure changes which change or may change the intent of the test must be approved by the Joint Test Group prior to the performance of the test. Any changes which clearly do not change the intent of the test (e.g., substitute data recording instrument which provides equivalent data as the specified instrument) will be properly documented and reviewed by the Joint Test Group subsequent to test performance. All changes to startup test procedures will be approved in accordance with technical specification requirements.

All plant modifications which are initiated as a result of system preoperational or acceptance tests shall be controlled in accordance with the procedure for modifications during plant construction. Any such modifications or repairs will be retested to the requirements of the test procedure. Subsequent to the completion of the system preoperational test, all modifications or repair activities shall be performed and retested in accordance with the normal station administrative procedures for modifications or maintenance as applicable.

14.2.5 Review, Evaluation and Approval of Test Results

Upon completion of each preoperational, acceptance, or startup test, the responsible test engineers shall review the test data for completeness, perform any evaluations or calculations required, and compare the results to the stated acceptance criteria. Any unresolved or incomplete items, including acceptance criteria, shall be described on a summary list of test exceptions. The test results shall then be submitted to the Joint Test Group or Station Operations Review Committee, as applicable for completion review and approval. Upon satisfactory review and approval by the Joint Test Group or Station Operations Review Committee, the test will be considered complete pending resolution or completion of any outstanding exceptions by the responsible organizations.

Insert "B"

Prior to the start of each major phase of the initial startup program identified in Table 14.2-2, the Station Operations Review Committee shall perform a preliminary review of all prerequisite testing to insure that it is satisfactorily completed to the extent necessary to perform the next phase of the startup program. This is assisted by a prerequisite list which shall be approved prior to the start of any test in the following phase of testing.

14.2.6 Test Records

A copy of all Preoperational Tests, Acceptance Tests, Startup Tests, Special Test Procedures, and all relevant data recorded during the conduct of the tests will be maintained for the life of the station in accordance with station procedures for record retention.

B

Prior to the start of fuel loading a final review will be made by the Joint Test Group of the preoperational test program to insure all required preoperational and acceptance tests have been conducted and test results approved. ~~If any exceptions do or to this exist at that time they will be~~

If during the course of the preoperational test program it becomes necessary to delay a portion of a preoperational test, ~~program other core tests~~, such tests will be incorporated into ~~the~~ the startup test program if ~~proper~~ adequate justification is present for delaying the test beyond core load. At this time only AT-17, Waste Solidification System Test, may be performed subsequent to core loading. This may be required if a permanent Waste Solidification System is not designed and ~~is not~~ installed at the time of fuel loading. This system will be tested subsequent to installation independent of the startup program.

14.2.7 Conformance of Test Programs with Regulatory Guides

The below listed Regulatory Guides will be followed, to the degree indicated, during the conduct of the Seabrook Station initial test program. 44

Regulatory Guide 1.8, Rev. 1-R
Personnel Selection and Training

The personnel selection and training program meets the requirements of Regulatory Guide 1.8 (1977 edition). For discussion, see Sections 13.1 and 13.2.

Regulatory Guide 1.20, Rev. 2
Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing

The Westinghouse position on Regulatory Guide 1.20, Rev. 2, is discussed in Subsection 3.9(N).2.4.

Regulatory Guide 1.33, Rev. ~~0~~ 2
Quality Assurance Program Requirements (Operation)

The quality assurance program for operation complies with the requirements of this Regulatory Guide. For further discussion, see Section 17.2.

Insert A

Regulatory Guide 1.41, Rev. 0
Preoperational Testing of Redundant Electric Power Systems to Verify Proper Load Group Assessments

Seabrook Station conforms with the recommendations of Regulatory Guide 1.41.

Regulatory Guide 1.52, Rev. 2
Design, Testing and Maintenance Criteria for Engineered Safety Feature Atmosphere Cleanup System Air Filtration and Absorption Units of Light Water Cooled Nuclear Power Plants

A detailed discussion on the degree of conformance to Regulatory Guide 1.52 is found in Section 6.5.1.

Regulatory Guide 1.68, Rev. 2
Initial Test Programs for Water-Cooled Nuclear Power Plants

The initial test program for the Seabrook Station will be conducted in accordance with the intent of Regulatory Guide 1.68 except for the items specified below:

1. During the preoperational test program, no practical method exists to vary system voltage to obtain maximum and minimum design voltages. The intent of the requirement to demonstrate that the emergency loads can start and operate with the maximum and minimum design voltage available will be met by testing the emergency loads under plant light load conditions to simulate the maximum practically obtainable voltage and under plant heavy load conditions to simulate the minimum practically obtainable voltage. The results of this testing will be compared to the station

"A"

Regulatory Guide 1.140, Rev. 1

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

A discussion of the degree of conformance to this regulatory guide is found in section 1.8. Initial testing of the applicable filtration systems shall be in accordance with the recommendations contained in this regulatory guide.

voltage study to verify the adequacy of the analytical model. (Appendix A, Section 1.g.2). 45

2. During power escalation, testing will be performed at approximately 30% rather than the 25% power plateau. Westinghouse-supplied plants have historically conducted tests at 30% and, therefore, generic data is available for review. (Section C.8; Appendix A, Section 5.)

3. Throughout core loading and precritical tests, the shutdown margin will be verified by periodic sampling of core coolant and verification that boron concentration is maintained at or above the Technical Specification concentration limit for refueling conditions. (Appendix A, Section 2.a)

4. Control rod runback and partial scram features are not used in the Seabrook Station design and, therefore, will not be tested during power escalation. (Appendix A, Section 5.j.)

5. A demonstration of the capability of systems and components to remove residual heat or decay heat from the Reactor Coolant System will be performed during power ascension testing only if not performed during hot functional or low power tests. (Appendix A, Section 5.1.)

6. The failed fuel detection system is not applicable to the Seabrook design and, therefore, will not be tested during power escalation. (Appendix A, Section 5.q.).

7. The integrated control system and the reactor coolant flow control system are not applicable to the Seabrook Station design and therefore, will not be tested during power escalation. The Startup and Emergency Feedwater Control Systems and the Steam Pressure Control Systems are only used in the hot shutdown, hot standby or low power operating modes. These systems can not be tested during power ascension. (Appendix A, Section 5.s.)

8. A demonstration of the dynamic response of the plant to a loss of or bypassing of a feedwater heater(s) will not be performed. As shown in FSAR Section 15.1.1, the transient resulting from the most severe case of feedwater temperature reduction initiated by a single failure or operator error is similar to, but of a lesser magnitude than the excessive load increase (load swing). The load swing test will be performed at several major plateaus.

9. As shown in FSAR subsection 15.2.3 and 15.2.4, dynamic response of the plant to a MSIV closure is bounded by the response of the plant to the turbine trip event. Plant response to a turbine trip will be demonstrated during performance of ST-38, Unit Trip from 100 Percent Power. The ability of the MSIVs to close under steam flow will be demonstrated by automatic closure of all main steam line isolation valves at 30 percent power during the performance of ST-47. (Appendix A. Section 5.m.m.)

delete ?

transient tests, the results obtained from such a test does not justify the severity of this transient on plant equipment. Proper operation of the MSIV's will be demonstrated during hot functional testing. (Appendix A, Section 5.m.m). 44

10. The ability of the incore and excore neutron flux instrumentation to detect control rod misalignments equal to or less than technical specification limits will be demonstrated at 50% power only. The design of the nuclear instrumentation is not intended to specifically detect a misaligned control rod but rather an anomolous core condition. The individual rod position indication system is the primary means for determining control rod misalignments. Since at 100% power the control rods are essentially fully withdrawn, individual rod worth is such that the ability of the nuclear instrumentation to detect a control rod misalignment is limited. Therefore, data on the nuclear instrumentation characteristics over a wide range of control rod insertions will be obtained during the static rod drop test at 50% power. (Appendix A, Section 5.i.)

11. Since Units 1 & 2 are essentially identical, the below listed tests, which will be performed on Unit 1 solely to verify the adequacy of calculational models, will either not be performed or reduced in scope during the Unit 2 initial startup program.

    a. The low power psuedo-rod-ejection test will be deleted for Unit 2. (Appendix A, Section 4.c.)

    b. The power coefficient measurement for Unit 2 will consist of a single measurement at approximately 75% power. (Appendix A, Section 5.a.)

12. Vibration levels of the reactor coolant system and piping reaction to transient conditions are measured during hot functional testing (Appendix A, 2.?)

Regulatory Guide 1.68.2. Rev. 1
Initial Startup Test Program to Demonstrate Remote Shutdown Capability for Water-Cooled Nuclear Power Plants

The remote shutdown capability of Seabrook Station will be demonstrated in accordance with the intent of Regulatory Guide 1.68.2.

Regulatory Guide 1.79, Rev. 1
Preoperational Testing of Emergency Core Cooling Systems for Pressurized Water Reactors

The initial test program for the Seabrook Station will be conducted in accordance with the intent of Regulatory Guide 1.79 except for the following:

1. Section C.1.c.(2) specifies that an opening test of the accumulator isolation valves be performed at the maximum differential pressure that the valve will experience using both normal and emergency power supplies. Since the valve operational capability is independent of the source of power and the valve motors are a small fraction of the

Regulatory Guide 1.108, Rev. 1
Periodic Testing of Diesel Generators Used as Onsite Electric Power Systems at Nuclear Power Plants

Seabrook Station is generally in conformance with Regulatory Guide 1.108. The detailed discussion on this guide is found in Section 1.8.

Regulatory Guide 1.128, Rev. 1
Installation Design and Installation of Large Storage Batteries for Nuclear Power Plants

Seabrook Station is generally in conformance with Regulatory Guide 1.128. The detailed discussion on this guide is found in Subsections 8.3.2 and 8.3.3.

14.2.8 Utilization of Reactor Operating and Testing Experiences in Development of the Test Program 44

The ~~YAEC~~ Startup Test ~~Group~~ Department will perform a survey of PWR operating experiences, encompassing approximately similar power plants over at least the two previous years. The survey will identify operating problem areas or categories of abnormal occurrences that are repeatedly being experienced by other facilities. This information will be appropriately incorporated into the Seabrook Startup Program.

14.2.9 Trial Use of Plant Operating and Emergency Procedures 44

The procedures used in the conduct of the preoperational test program will reference the station operating, emergency and surveillance procedures whenever possible. During initial startup, plant operating and emergency procedures will be used almost exclusively to operate the plant and its systems. Whenever corrections to station procedures are identified during testing, the corrections will be evaluated and the procedures revised accordingly.

A description of station procedures is provided in Section 13.5.

14.2.10 Initial Fuel Loading and Initial Criticality 44

The following describes the general approach used to prepare for and perform initial fuel loading and initial criticality. Detailed procedures prepared and approved in accordance with Table 14.2-1 will govern the actual work activities.

14.2.10.1 Initial Fuel Loading 44

Initial fuel loading will not begin until all prerequisite system tests and operations are completed to the satisfaction of the Station Operations Review Committee.

Fuel handling tools and equipment will have been checked out and dry runs conducted in the use and operation of the tools and equipment.

TABLE 14.2-1
(Sheet 1 of 3)

INITIAL TEST PROGRAM RESPONSIBILITY/AUTHORITY MATRIX

Activity	Preoperational Test Program		Initial Startup Program		
	Individual System Tests	Integrated Systems Tests	Core Load	Criticality & Physics Tests	Power Escalation Tests
Test Program Management	STG	STG	STG	STG	STG
Test Procedure Preparation	STG or AE	STG	STG or SS	STG or SS	STG or SS
Test Procedure Approval	AE, STG, SS	AE, STG, SS	STG, SORC	STG, SORC	STG, SORC
Test Coordination & Direction	STG	STG	SS	STG or SS	STG or SS
Systems & Equipment Operations	SS	SS	SS	SS	SS
Systems & Equipment Maintenance	AE or SS	SS	SS	SS	SS
Test Completion Approval	AE, STG, SS	AE, STG, SS	STG, SORC	STG, SORC	STG, SORC
Technical Support	NSD, NSS, AE, TG	NSD, NSS, AE, TG	NSD, NSS, AE	NSD, NSS, AE	NSD, NSS, AE, TG

Definitions for

TABLE 14.2-1
(Sheet 2 of 3)

Test Program Management

"Test Program Management" defines the organization responsible for coordinating and sequencing of the initial test program activities.

Test Procedure Preparation

"Test Procedure Preparation" defines the organization responsible for preparation of the test procedure initial draft, coordination of the procedure review, and resolution of comments.

Test Procedure Approval

"Test Procedure Approval" defines the organization that will review and approve test procedures prior to their performance.

Test Coordination and Direction

"Test Coordination and Direction" defines the organization that will coordinate the activities prior to, during and after each test. A Test Director will insure that the test is properly conducted and all relevant data is properly recorded. Upon completion of the test, the data will be analyzed for completion review and approval.

Systems and Equipment Operations

"Systems and Equipment Operations" defines the organization responsible for the operation of the plant equipment during each phase of the test program.

System and Equipment Maintenance

"System and Equipment Maintenance" defines the organization responsible for the maintenance of plant equipment during each phase of the test program.

Test Completion Approval

"Test Completion Approval" defines the organizations that will review and approve the results of completed test procedures.

TABLE 14.2-3
(Sheet 1 of 46)

PREOPERATIONAL TEST ABSTRACTS

Index

Defini...ns for

TABLE 14.2-1 (Cont'd)
Sheet 3 of 3

Technical Support

"Technical Support" defines the off-site organizations that will be used to provide technical input for the initial test program, as required.

Legend:

STG	Startup Test Group - Yankee Atomic Electric Company
NSS	Nuclear Steam Supply Vendor - Westinghouse Electric Corporation
AE	Arch...t-Engineer and Construction Manager - United Engineers & Constructors
SS	Station Staff - Public Service Company of New Hampshire
NSD	Nuclear Services Division - Yankee Atomic Electric Company
TG	Turbine Generator Vendor - General Electric Company
SORC	Station Operations Review Committee

TABLE 14.2-3
(Sheet 2 of 46)

TABLE 14.2-3
(Sheet 3 of 46)

I. REACTOR COOLANT PUMPS

Objective

To verify proper operation of the reactor coolant pumps, and to establish baseline data for pump operations. 44

Plant Conditions Prerequisites

Prior to and during hot functional testing.

Test Method

Instructions will be given specifying the required operations for the initial run of the reactor coolant pumps. Interlocks and controls will be tested. Pump operating data will be recorded. Additional operating data will be obtained during hot functional testing.

Acceptance Criteria

All reactor coolant pump controls, interlocks, and alarms function per design, and all manufacturer's pump data is verified to be accurate. Baseline pump and motor data is collected. 44

delete

Reactor coolant pump controls and interlocks operate in accordance with the requirements of FSAR Section 5.4.1, and baseline pump and motor data is collected.

TABLE 14.2-3
(Sheet 4 of 46)

2. PRESSURIZER RELIEF TANK

Objective

To verify that the pressurizer relief tank provides adequate control of the discharges from the pressurizer relief valves. 44

Plant Conditions/Prerequisites

Prior to and during hot functional testing.

Test Method

The operation of the pressurizer relief tank will be demonstrated by performing operability checks of the tank and associated instrumentation and auxiliary equipment. During hot functional tests, the ability of the system to receive and cooldown a discharge from the power operated relief valves will be verified. 44

Acceptance Criteria

Delete

The pressurizer relief tank accepts discharge from the primary plant in accordance with the system design requirements, and the heat dissipation capabilities of the pressurizer relief tank are verified. 44

The pressurizer relief tank operates in accordance with the requirements of FSAR Section 5.4.11.2 and 5.4.11.4.

TABLE 14.2-3
(Sheet 5 of 46)

3. REACTOR COOLANT AND ASSOCIATED SYSTEMS PIPING VIBRATION TEST

Objective

To demonstrate that vibration levels in selected ASME Code Class 1, 2 and 3 systems, Seismic Category I systems, and other high energy piping systems located in Seismic Category I structures are acceptable.

Plant Conditions/Prerequisites

Prior to and during hot functional testing. The specific conditions required for each system will be specified by the test procedure.

Test Method

Selected lines will be instrumented and the amplitude of the vibrations measured for various operational modes. Non-instrumented piping will be inspected during system operation to ensure vibration levels are within acceptable limits.

Acceptance Criteria

delete

Vibration levels are within specified test procedure limits, and test results satisfy FSAR Subsection 3.9(N).2.1. 44

The reactor coolant and associated system piping vibration does not exceed the requirements of Section III of the ASME Code, paragraph NB-3622.3.

TABLE 14.2-3
(Sheet 6 of 46)

4. REACTOR COOLANT AND ASSOCIATED SYSTEMS THERMAL EXPANSION AND RESTRAINT TEST

Objective

To verify that the reactor coolant and other selected plant systems are free to expand during plant heatup and contract during plant cooldown. 44

Plant Conditions/Prerequisites

During heatup and cooldown for hot functional testing. Preservice inspection has been completed for hydraulic snubbers. 44

Test Method

Baseline position data will be taken at selected points on components and piping at cold plant conditions. During heatup to normal operating temperatures, expansion data will be taken at specified temperature plateaus at these selected points. An inspection will be performed to detect any points of interference which will be corrected prior to continuing the heatup. Hydraulic snubbers will also be visually inspected during heatup and cooldown to demonstrate operability. Following the cooldown, a final check of piping and component baseline positions will be obtained. 44

Acceptance Criteria

The reactor coolant and selected plant systems are free to expand and contract without obstruction during heatup and cooldown of the system. Pipe movement does not cause undue stress as determined by inspection. 44

During heatup and cooldown of the reactor coolant system, the system piping is free to expand and contract in accordance with FSAR Section 3.9(B).2.1.b.

TABLE 14.2-3
(Sheet 8 of 46)

6. CVCS - BORON THERMAL REGENERATION SYSTEM

Objective

To demonstrate the operational capability of the boron thermal regeneration system (BTRS).

Plant Conditions/Prerequisites

Prior to and during hot functional testing.

Test Method

Prior to hot functional testing, system components will be operationally checked to the extent practical. During hot functional testing, the system will be operated in its various operational modes and relevent pressure, temperature and flow data recorded.

Acceptance Criteria

~~The system flow control and fluid temperature control are in accordance with design criteria for both boration and dilution modes of operation.~~ delete 44

The boron thermal regeneration system operates in accordance with the requirements of FSAR Section 9.3.4.2.d.

TABLE 14.2-3
(Sheet 9 of 46)

7. RESIDUAL HEAT REMOVAL SYSTEM

Objective

To demonstrate the operational capability of the residual heat removal system, and to establish baseline data for pump operation. 44

Plant Conditions/Prerequisites

Prior to hot functional testing.

Test Methods

The residual heat removal (RHR) system will be tested to verify controls and interlocks and to determine system operating characteristics. Additional testing will be performed during the integrated plant cooldown from hot functional tests.

Operability of relief valves will be verified.

Acceptance Criteria

The residual heat removal system operates in accordance with the requirements of FSAR Section 5.4.7. 44

TABLE 14.2-3
(Sheet 10 of 46)

8. ECCS PERFORMANCE TEST

Objective

To demonstrate the capability of the emergency core cooling systems to pump water from the refueling water storage tank into the reactor vessel through various combinations of pumps and injection lines.

Plant Conditions/Prerequisites

Prior to initial core loading with the reactor vessel open.

Test Method

A series of flow tests will be run using the centrifugal charging pumps, safety injection pumps, and RHR pumps to verify proper flow rates and to perform any required flow balancing during pumping from the RWST to the reactor vessel. The draw-down characteristics of the RWST and SAT will be demonstrated during these operations. Appropriate data will be obtained to determine pump headflow characteristics. The ability of the RHR pumps to supply water to the SI and the centrifugal charging pumps will be demonstrated. The operation of the boron injection tank recirculation system and heat tracing system will be verified. The operability of the RWST and the SAT (ECCS water sources) will be demonstrated. 44

Acceptance Critria

~~The ECCS systems meet the design requirements of FSAR Section 6.3, and the ECCS systems operate in accordance with requirements of the safety analysis in the FSAR.~~ 44

The emergency core cooling system operates in accordance with the requirements of FSAR Section 6.3.2.1.

Margin between pump motor current trip points and current values at full design flow conditions will be demonstrated.

TABLE 14.2-3
(Sheet 11 of 46)

9. ECCS HOT FUNCTIONAL TEST

Objective

To demonstrate the capability of the emergency core cooling systems to pump into the reactor coolant system at operating conditions, and to verify that the accumulator check valves operate properly at higher temperatures.

Plant Conditions/Prerequisites

During hot functional testing and during cooldown from hot functional testing. 44

Test Method

Water from the RWST will be injected into the reactor coolant system utilizing the centrifugal CVCS pumps to the extent necessary to verify check valve operation and to obtain rated pump flow. The duration of injection will be limited to minimize thermal shock effects. During the cooldown from hot functional tests, this test will be performed using the safety injection pums and the accumulators. Following each injection, the ability of the check valves to reseat will be verified.

Acceptance Criteria

Emergency core cooling water is injected into the primary system by each subsystem at its design operating limit in accordance with FSAR Section 6.3.2.1 ~~and the associated system check valves reseat properly.~~ 44

The associated system check valves are tested for leakage in accordance with Technical Specification 4.0.5.

TABLE 14.2-3
(Sheet 12 of 46)

10. SAFETY INJECTION ACCUMULATOR BLOWDOWN TEST

Objective

To demonstrate proper system actuation and flow rate for the test conditions, and to demonstrate isolation valve operability.

Plant Conditions/Prerequisites

Prior to initial core loading with the reactor vessel open.

Test Method

The accumulators will be filled to their normal operating level and pressurized to a specified pressure. The accumulators will be discharge one at a time into the vessel and data will be collected to determine the rate of discharge. The accumulators will again be filled and pressurized to the maximum expected accumulator precharge pressure. The accumulator isolation valves will be opened under the maximum differential pressure condition.

Acceptance Criteria

Safety injection accumulator response is in accordance with FSAR Section 6.3 design requirements, and the isolation valves are capable of opening with maximum ~~differential~~ cover pressure/ specified in Technical Specification 3.5.1. 44

TABLE 14.2-3
(Sheet 13 of 46)

11. CONTAINMENT RECIRCULATION SUMP OPERABILITY DEMONSTRATION

Objective

To verify the operability of the ECCS sump.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

The ECCS sump will be filled to its anticipated post-LOCA level. An RHR and a containment spray pump will be operated at post-LOCA recirculation flow rates and recirculated back to the sump. Appropriate pressure and flow data will be recorded to verify net positive suction head characteristics.

Acceptance Criteria

~~Sufficient NPSH is provided to the RHR and CBS pumps at post-LOCA conditions by the containment building sumps.~~ 44

The containment building sump provides fluid suction pressure greater than the net positive suction head required (as specified in the certified pump curves) to the RHR and CBS pumps at post-LOCA conditions.

TABLE 14.2-3
(Sheet 15 of 46)

13. MAIN STEAM LINE ISOLATION VALVES

Objective

To verify proper operation of the main steam line isolation valves.

Plant Conditions/Prerequisites

Prior to and during hot functional testing.

Test Method

Operation of the main steam line isolation and bypass valves will be demonstrated at cold plant conditions including the response to a main steam line isolation signal. During hot functional tests, valve operation will be demonstrated and the closure time measured.

Acceptance Criteria

delete

Associated valve instrumentation, controls, alarms and interlocks operate as designed in response to normal or simulated input signals.

Valve closure times meet technical specification requirements under dynamic hot functional conditions.

44

The main steam line isolation system operates in accordance with the requirements of FSAR Section 5.4.5 and valve closure times meet Technical Specification Table 3.6-1 requirements for Main Steam Isolation Valves and Main Steam Isolation Valve Bypass Valves.

14. EMERGENCY FEEDWATER SYSTEM

Objective

To demonstrate proper operation of the emergency feedwater system.

Plant Conditions/Prerequisites

Prior to during hot funcitonal testing.

Test Method

Prior to hot functional tests, emergency feedwater pump and feedwater isolation valve control and operability checks will be performed to the extent practical.

During hot functional tests, each emergency feedwater pump will be operated to verify pump head-flow characteristics and to demonstrate the capability to feed the steam generators while at pressure. System response to ESF actuation signals, including the operation of the feedwater isolation valves, will be demonstrated.

A 48-hour endurance run and subsequent restart will be performed on each emergency feedwater pump to demonstrate long term reliability.

At least five (5) consecutive, successful, cold, pump starts for each emergency feedwater pump will be demonstrated.

Heat removal of the primary system using the emergency feedwater system under a simulated loss of offsite and onsite ac power condition will be demonstrated.

The proper operation of the emergency feedwater flow-restricting venturis will be demonstrated.

A flow instability test will be performed to demonstrate a "water hammer" will not occur in system components, piping or inside the steam generators during normal system startup operation.

The operation of the associated ventilation system will be verified during this test.

The operation of the condensate storage system will be demonstrated.

Acceptance Criteria

The emergency feedwater system operates in accordance with the requirements of FSAR Section 6.8.

The emergency feedwater pump can operate for the 48-hour endurance run with a subsequent restart without exceeding the operational limitations listed in the plant operating procedures.

Feedwater isolation valve closure times meet Technical Specification Table 3.6-1 requirements.

Heat removal of the primary system under a simulated loss of offsite and onsite ac power condition is demonstrated.

Emergency feedwater flow-restricting venturis limit flows in accordance with FSAR Subsection 6.8.2.

TABLE 14.2-3
(Sheet 17 of 46)

15. SERVICE WATER SYSTEM

Objective

To demonstrate the proper operation of the service water system.

Plant Conditions/Prerequisites

Prior to and during hot functional testing. Cooling tower performance will be demonstrated when adequate heat loads are present on the system.

Test Method

Prior to hot functional tests, control system functional tests will be performed. Pump and overall system performance data will be obtained using both the ocean and the cooling tower as the source of cooling water. During hot functional testing, the ability to maintain required component temperatures will be verified. When adequate heat loads are available, a cooling tower performance test will be performed. The operation of the associated ventilation systems for the service water pumphouse and cooling tower will be demonstrated.

Acceptance Criteria

delete

The service water system pumps meet or exceed design flow and pressure requirements.

Instrumentation, controls, interlocks and alarms operate as designed in response to normal or simulated input signals.

Each system flow train supplies ~~adequate~~ cooling water to both safety and non-safety related loops in the normal plant configuration and to safety-related loops in the accident configuration utilizing either the ocean or cooling tower.

The cooling tower performance test results ~~assure acceptable tower performance in~~ demonstrate the dissipation of the heat loads specified in Table 9.2-13 of the FSAR.

~~Post-hfe~~ Cooling tower makeup water equipment meets FSAR Section 9.2.5.3c criteria.

The service water system operates in accordance with the requirements of FSAR Sections 9.2.1 and 9.2.5.

44

TABLE 14.2-3
(Sheet 18 of 46)

16. PRIMARY COMPONENT COOLING WATER SYSTEM

Objective

To demonstrate the proper operation of the PCCW System.

Plant Conditions/Prerequisites

Prior to and during hot functional testing.

Test Method

Prior to hot functional testing, system component operability checks and control system functional tests will be performed. During hot functional tests, data will be taken to verify that adequate cooling is being provided to PCCW components.

Acceptance Criteria

delete

The primary component cooling water system pumps meet or exceed design flow and pressure requirements. Instrumentation, controls, alarms and interlocks operate as designed in response to normal or simulated input signals. The system supplies adequate cooling to both the safety and non-safety-related loops in the normal plant configuration and to the safety-related loops in the accident configuration.

44

The primary component cooling water system operates in accordance with the requirements of FSAR Section 9.2.2.

The system supplies cooling water to both the safety and non-safety-related loops in the normal plant configuration and to safety-related loops in the accident configuration.

TABLE 14.2-3
(Sheet 19 of 46)

17. SPENT FUEL POOL COOLING SYSTEM

Objective

To demonstrate the proper operation of the spent fuel pool cooling system.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

Spent fuel pool cooling and cleanup system equipment operabilty checks, flow verification tests and control system functional tests will be performed in the various system operational modes to demonstrate proper system performance. Antisiphon devices, high radiation alarms, and low water level alarms will be demonstrated

Acceptance Criteria

~~The spent fuel pool cooling system pumps meet or exceed design flow and pressure requirements. Instrumentation, controls, alarms and interlocks operate as designed in response to normal or simulated input signals. Normal and alternate system design flow paths are demonstrated.~~ 44

The spent fuel pool cooling system operates in accordance with the requirements of FSAR Section 9.1.3.

Normal and alternate system design flow paths are demonstrated.

Leak tests of sectionalizing devices will be demonstrated operable.

TABLE 14.2-3
(Sheet 20 of 46)

18. EXCORE NUCLEAR INSTRUMENTATION

Objective

To verify the calibration of the excore nuclear instrumentation.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

The excore nuclear instrument channels will be calibrated and functionally checked to verify alarm and trip setpoints and the operation of auxiliary equipment. The response of the source range detectors to a neutron source will be verified.

Acceptance Criteria

The reactor trip set points and interlocks generated by the nuclear instrumentation system have been verified at the values specified in ~~the~~ Technical Specifications Table 2.2-1.

The control and indication functions of the nuclear instrumentation system have been demonstrated to be in accordance with the FSAR Section 7.2. The overall time-response of the nuclear instrumentation channels has been demonstrated at the values specified in ~~the~~ Technical Specifications Table 3.3-2.

44

TABLE 14.2-3
(Sheet 21 of 46)

19. REACTOR PROTECTION SYSTEM

Objective

To verify proper operation and response time of the reactor protection system.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

The operation of the reactor protection system will be verified for all conditions of logic using outputs or simulated outputs from each of the RPS sensors through to tripping of the reactor trip breakers. Individual protection channels will be tested to check design redundancy and to demonstrate safe failure on loss of power. ~~The response time of each RPS signal will be determined from the sensor output to tripping of the reactor trip breaker.~~ input

Acceptance Criteria

The reactor protection system has been verified to operate in accordance with the design requirements dictated by the FSAR Section 7.2.

The reactor protection time response has been verified to meet the requirements specified in ~~the~~ Technical Specifications Table 3.3-2. All reactor protection system trip setpoints and interlocks have been demonstrated at the values specified in ~~the~~ Technical Specifications Table 2.2-1. 44

The reactor trip system response time shall be the time interval from when the monitored parameter exceeds its trip setpoint at the channel sensor until loss of stationary gripper coil voltage.

TABLE 14.2-3
(Sheet 22 of 46)

20. ENGINEERED SAFETY FEATURES

Objective

To verify proper operation and response time of the engineered safety features (ESF) actuation logic.

Plant Conditions/Prerequisites

Prior to ESF integrated actuation test.

Test Mehtod

The operation of the ESF logic will be verified for all modes of operation using outputs or simulated outputs from each of the sensors through to the output of the slave relays. Individual ESF channels will be tested to verify design redundancy. The response time of required ESF signals will be determined from the sensor output to equipment actuation.

Acceptance Criteria

The engineered safety features have been demonstrated to operate in accordance with the design requirements of FSAR Section 7.3. The engineered safety features time response has been verified to meet the requirements specified by ~~the~~ Technical Specifications Table 3.3-4. 44

TABLE 14.2-3
(Sheet 27 of 46)

25. CONTAINMENT COMBUSTIBLE GAS CONTROL SYSTEM

Objective

To demonstrate the proper operation of the containment combustible gas control system.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

Containment combustible gas control system operability checks, flow verification tests, and control system functional tests will be performed to demonstrate proper system performance.

Acceptance Criteria 44

delete

~~The thermal hydrogen recombiners meet, or exceed, design flow and temperature requirements. The hydrogen analyzers are calibrated and function as designed. The backup purge system functions as designed.~~ 44

the containment combustible gas control system operates in accordance with the requirements of FSAR Section 6.2.5.

30. AC ELECTRICAL DISTRIBUTION

Objective

To demonstrate the capability of the offsite power system to serve as a source of power to the emergency buses.

Plant Conditions/Prerequisites

During hot functional testing.

Test Method

Tests will be performed to demonstrate the capability of the UAT's and the RAT's to supply power to the emergency buses while under a full load Hot Functional conditions from the plant auxiliaries and the emergency buses.

Tests will also be performed to demonstrate the transfer capabilities between the UAT's and the RAT's.

Acceptance Criteria

The AC electrical distribution system operates in accordance with the requirements of FSAR Section 8.3.

TABLE 14.2-3
(Sheet 33 of 46)

31. 125 VDC DISTRIBUTION SYSTEM

Objective

To demonstrate the proper operation of the 125 vdc distribution system.

Plant Conditions/Prerequisites

Prior to loss of offsite power tests.

Test Methods

Tests will be performed to demonstrate operation of instrumentation and alarms, and that actual total system amperage loads are in agreement with design loads. A discharge test of each battery bank will be conducted. System interlocks will be verified to demonstrate proper operation under accident conditions. The independence of redundant power supplies and load groups will be verified. 44

Acceptance Criteria

delete

Instrumentation, controls, alarms and interlocks operate as designed in response to normal or simulated input signals. Full-load and design duration discharge tests demonstrate that the battery bank voltage minimum limit and individual cell limits are not exceeded. 44

the DC power system operates in accordance with the requirements of FSAR Section 8.3.2.

TABLE 14.2-3
(Sheet 34 of 46)

32. 120 VAC VITAL INSTRUMENT POWER SUPPLY

Objective

To demonstrate the proper operation of the 120 vac vital instrumentation power supply.

Plant Conditions/Prerequisites

Prior to loss of offsite power tests.

Test Methods

Full-load tests for the uninterruptible power supplies to the vital buses will be conducted using normal and emergency sources of power supplies to the bus. System interlocks will be verified to demonstrate proper operation. The independence of the redundant power supplies and load groups will be verified. 44

Acceptance Criteria

delete

Instrumentation, controls, alarms and interlocks operate as designed in response to normal or simulated input signals. Full-load tests demonstrate the capability of the system to meet its design requirements. 44

the 120 vac vital instrument power supply system operates in accordance with FSAR Subsection 8.3.1.1.d.

33. DIESEL GENERATORS

Objective

To demonstrate reliability and extended full-load carrying capability of the emergency diesel generator units.

Plant Condition/Prerequisites

Prior to core loading. Where possible, diesel generator reliability testing will be completed prior to loss of offsite power test.

Test Method

System and component operability checks will be performed on the diesel engine support and ventilation systems.

Protective features and interlocks will be demonstrated operable.

Full-load-carrying capability for an interval of not less than 24 hours will be demonstrated operable in accordance with RG 1.108 position 2.a(3).

Diesel generator load shedding will be demonstrated operable in accordance with RG 1.108 position 2.a(4).

Diesel generator functional capability at full-load temperature will be demonstrated operable in accordance with RG 1.108 position 2.a(5) with exception as described in FSAR section 1.8.

Diesel generator reliability will be demonstrated by performing 35 consecutive valid starts per diesel generator in accordance with RG 1.108 position 2.a(9).

Acceptance Criteria

The diesel generators operate in accordance with the requirements of FSAR subsection 8.3.1.1.e and complete the testing specified above.

TABLE 14.2-3
(Sheet 36 of 46)

34. FUEL HANDLING AND TRANSFER EQUIPMENT

Objective

To demonstrate the proper operation of fuel handling equipment.

Plant Conditions/Prerequisites

Prior to storage of new fuel and initial core loading, as applicable.

Test Method

Tests will be performed prior to core loading to demonstrate the functional operability, controls and protective interlocks of the fuel handling and transfer equipment used for handling spent fuel. Components required for new fuel storage will be checked prior to the receipt of new fuel.

Acceptance Criteria

~~Fuel handling equipment provides for storage, transfer and handling of fuel assemblies as designed.~~ delete 44

The fuel handling and transfer equipment operate in accordance with the requirements of FSAR Sections 9.1.1 and 9.1.2.

Dynamic and static load testing of cranes, hoists, and associated lifting and rigging equipment, including the fuel cask handling can has been completed. Static testing has been performed at 125% of rated load and full operational testing has been performed at 100% of rated load.

TABLE 14.2-3
(Sheet 38 of 46)

36. PRIMARY CONTINMENT STRUCTUREAL ~~ACCEPTANCE~~ INTEGRITY TEST

Objective

To ~~perform a~~ structural ~~acceptance~~ integrity verification of the containment structure.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

A structural acceptance test will be performed in accordance with Regulatory Guide 1.18.

The containment will be pressurized to 115% (60 psig) of the design pressure (52 psig), with inside and outside temperatures monitored and controlled.

Structural responses to test conditions will be measured and compared to predicted responses, to verify that structural behavior is as analytically anticipated. 44

Acceptance Criteria

The reactor containment structure meets structural integrity design requirements, as defined by regulatory guides and codes described in FSAR Subsections 3.1, 3.8 and 6.2. 44

TABLE 14.2-3
(Sheet 39 of 46)

37. PRIMARY CONTAINMENT LEAK RATE TESTS

Objective

To perform the initial primary containment leak rate tests.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

Type A, B and C primary containment leak rate tests will be performed in accordance with the requirements of 10 CFR 50, Appendix J.

Prior to the Type A test, Type C (containment isolation valve leakage rate test) tests will be performed at a pressure not less than Pa (46.1 psig). Valve leakage rates will be recorded and verified within allowable design limits.

Prior to the Type A test and concurrent with Type C tests, Type B (containment penetration leakage rate test) tests will be performed on containment airlocks, hatches, electrical penetration and fuel transfer tube, at a pressure not less than Pa.

Type C and B leakage rate results will be totaled and verified within allowable design limits.

On completion of all prerequisite testing, the containment will be pressurized to Pa; while pressure, temperature and dew point will be controlled, recorded and allowed to stabilize. Test conditions will be maintained for a minimum 8 hour period and, utilizing the perfect gas law, leakage rate in percent per day will be computed from the changes in containment air mass.

At the end of the prescribed test period, an instrument accuracy verification test will be performed on the containment to verify test instrumentation and test results accuracy. 44

Acceptance Criteria

Type A, B and C leak rates ~~are within their respective allowable design limits,~~ and instrumentation accuracy is verified to be within allowable design limits as set forth in ~~10 CFR, Appendix J, criteria.~~ FSAR Section 6.2. 44

39. LOSS OF OFFSITE POWER TESTS

Objective

To demonstrate the proper response of plant systems to a loss of offsite power.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

Startup operation of the diesel generator units will be demonstrated by simulating loss of all a.c. voltage in accordance with RG 1.108 position 2.a(1).

Proper operation for design-accident-loading-sequence to design-load requirements will be demonstrated in accordance with RG 1.108 position 2.a(2). This testing will be conducted with one diesel generator unit at a time. The bus not being tested will be monitored to verify absence of voltage. Load testing of the batteries will also be demonstrated.

The ability to (a) synchronize with offsite power, (b) transfer load to offsite power, (c) isolate the diesel generator unit, and (d) restore it to standby status will be demonstrated in accordance with RG 1.108 position 2.a(6).

The capability of the diesel generator unit to supply emergency power within the required time is not impaired during periodic testing will be demonstrated in accordance with RG 1.108 position 2.a(8).

Testing will be conducted in which both diesel generator units will be started simultaneously to help identify certain common failure modes undetected in single diesel generator unit tests in accordance with RG 1.108 position 2.b.

Acceptance Criteria

Diesel generator operation and circuit breaker sequencing are in accordance with FSAR design requirements of Section 8.3.

TABLE 14.2-3
(Sheet 42 of 46)

40. INTEGRATED HOT FUNCTIONAL TESTS

Objective

To verify the proper operation of various primary and secondary instrumentation, controls and components at normal operating temperatures and pressures and to provide general guidance for the conduct of hot functional testing.

Plant Conditions/Prerequisites

Prior to initial criticality.

Test Method

General guidelines for the conduct of the hot functional test program will be provided. Following plant heatup, the reactor coolant temperature and pressure will be maintained at normal operating values. A series of tests, which are listed below, will be performed to verify system operation.

a. Demonstration of the pressurizer pressure control system ability to maintain RCS pressure.

b. Demonstration of the pressurizer level control system ability to maintain pressurizer level.

c. Demonstration of the RCS leak detection capability.

d. Verification of steam generator level instrumentation operability.

e. Verification of selected primary and secondary plant instrumentation operability.

f. Demonstration of the Remote Shutdown Panel to maintain the plant in a hot shutdown condition.

g. Initial roll of the turbine generator with main steam, including verification of turbine stop, reheat and intercept valve operation.

h. Verification of pressurizer and main steam safety valve setpoints.

i. Demonstration of Condenser steam dump valve operation.

j. Demonstration of containment penetration cooling capacity.

40. INTEGRATED HOT FUNCTIONAL TESTS (Cont'd)

In addition to the above, other tests specified in Tables 14.2-3 and 14.2-4 as being performed during hot functional testing will be performed at this time. After the completion of at temperature testing, the plant will be cooled down.

Acceptance Criteria

~~Satisfactory demonstration of system and instrumentation operation in accordance with FSAR requirements.~~ delete

44

the plant has been operated at hot condition in accordance with normal plant operating procedures and the following systems operate in accordance with the requirements of the FSAR or Technical Specifications listed below:

System	
Pressurizer pressure control	FSAR Subsection 7.7.1
Pressurizer level control	FSAR Subsection 7.7.1
RCS leak detection capability	FSAR Subsection 5.2.5
Remote shutdown panel	FSAR Subsection 7.4.1.3
Turbine generator	FSAR Section 10.2
Pressurizer safety valve lift setting	TS 3.4.2.1
Steam line safety valve lift setting	TS Table 3.7-2

TABLE 14.2-3
(Sheet 45 of 46)

42. INTEGRATED PLANT COOLDOWN FROM HOT FUNCTIONAL TESTS

Objective

To demonstrate the ability to bring the plant from normal operating temperature and pressure to cold shutdown conditions.

Plant Conditions/Prerequisites

The plant is at normal temperature and pressure following the completion of hot functional testing.

Test Method

The plant will be brought to cold shutdown conditions using steam dumps and the residual heat removal system, as required. During operation of the residual heat removal system, data will be collected to verify its heat removal capability. At specific points, the cooldown will be terminated to allow the performance of specified hot functional tests.

Acceptance Criteria

The plant has been brought to cold shutdown conditions in accordance with normal plant operating procedures. 44

cooldown rates will be monitored and controlled.

The cooldown limitations of Technical Specification 3.4.10.1 will not be exceeded.

TABLE 14.2-3
(Sheet 46 of 46)

43. REACTOR POST-HOT FUNCTIONAL INSPECTION

Objective

To provide a sequence of operations to be followed after hot functional tests to disassemble, clean, and inspect the reactor vessel and internals.

Plant Conditions/Prerequisites

After completion of hot functional testing and prior to initial core loading.

Test Method

Instructions will be given describing the required steps to disassemble, inspect, and clean the reactor vessel and its internals.

Acceptance Criteria

~~The reactor vessel cleaning and inspections are satisfactorily completed.~~

The reactor vessel is cleaned to the requirements of plant procedures and the internals are inspected in accordance with FSAR Section 3.9(N).2.4.

TABLE 14.2-4
(Sheet 1 of 37)

ACCEPTANCE TEST ABSTRACTS

Index

TABLE 14.2-4
(Sheet 2 of 37)

Index (Cont'd)

TABLE 14.2-4
(Sheet 3 of 37)

1. FEEDWATER SYSTEM

Objective

To demonstrate the proper operation of the feedwater system.

Plant Conditions/Prerequisites

Prior to and during hot functional testing.

Test Method

Prior to hot functional testing, the operability of the startup feedwater pump will be demonstrated. The control and performance characteristics of the turbine-driven feedwater pumps will be operationally checked to the extent practical using the auxiliary boiler as a source of steam. During hot functional tests, the operation of the turbine-driven feedwater pumps will be demonstrated using main steam.

Acceptance Criteria

delete

The startup feedwater pump meets or exceeds design flow and pressure requirements.

The turbine-driven feedwater pumps meet or exceed design flow and pressure requirements at operating conditions prevalent during hot functional testing.

System instrumentation, controls, alarms and interlocks operate as designed in response to normal or simulated input signals. 44

The feedwater system operates in accordance with the requirements of FSAR Sections 10.4.7 and 10.4.12 for the conditions prevalent during hot functional testing.

TABLE 14.2-4
(Sheet 4 of 37)

2. EXTRACTION STEAM AND HEATER DRAIN SYSTEMS

Objective

To demonstrate the proper operation of the extraction steam and heater drain system equipment.

Plant Conditions/Prerequisites

Prior to hot functional testing.

Test Method

Functional tests will be performed to verify, to the extent practical, the proper operation of equipment associated with the extraction steam and heater drain systems.

Acceptance Criteria

The extraction steam and heater drain systems performance, to the extent practical, is in accordance with ~~design criteria~~ FSAR Subsections 10.2.2.3 and 10.4.7 in response to simulated input signals. 44

TABLE 14.2-4
(Sheet 5 of 37)

3. CONDENSATE SYSTEM

Objective

To demonstrate the proper operation of the condensate system.

Plant Conditions/Prerequisites

Prior to and during hot functional testing.

Test Method

Tests will be performed to demonstrate the operational performance characteristics of the condensate pumps, the hotwell level control system, and the condensate makeup water system.

Acceptance Criteria

delete

The Condensate pumps meet or exceed design flow and pressure requirements at operating conditions prevalent up to and including hot function testing.

System instrumentation, controls, interlocks and alarms operate as designed in response to normal or simulated input signals.

44

The condensate system operates in accordance with the requirements of FSAR Section 10.4.7 at conditions prevalent up to and including hot functional testing

TABLE 14.2-4
(Sheet 7 of 37)

5. CHEMICAL ADDITION SYSTEM

Objective

To demonstrate the proper operation of the secondary plant chemical addition system.

Plant Conditions/Prerequisites

Prior to hot functional testing.

Test Method

Functional tests will be performed on the chemical addition pumps and associated instrumentation and controls to demonstrate proper operation.

Acceptance Criteria

delete

~~The chemical addition system pumps can deliver calibrated chemical volumes to the associated systems normal injection point at design conditions.~~

~~System instrumentation, controls, interlocks and alarms operate as designed, in the course of sampling associated system fluids.~~

44

the chemical addition system operates in accordance with the requirements of FSAR Section 10.3.5.

TABLE 14.2-4
(Sheet 8 of 37)

6. CIRCULATING WATER SYSTEM

Objective

To demonstrate the proper operation of the circulating water system.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

Functional testing of system components, instrumentation and controls will be performed to demonstrate operability. An overall system ~~hydraulic~~ dynamic performance test will be run to determine specific system operating parameters and response during steady state, transient, and backflush operational modes. Proper operation of the pumphouse ventilation system will be verified.

Acceptance Criteria

Delete

~~Satisfactory system performance during various modes of operation, e.g., heat treatment, startup and shutdown, shall be demonstrated.~~

~~System instrumentation, controls, alarms and interlocks operate as designed in response to normal or simulated input signals.~~ 44

The circulating water system operates in accordance with the requirements of FSAR Section 10.4.5.

TABLE 14.2-4
(Sheet 9 of 37)

7. SECONDARY COMPONENT COOLING WATER SYSTEM

Objective

To demonstrate the proper operation of the secondary component cooling water (SCCW) system.

Plant Conditions/Prerequisites

Prior to and during hot functional testing.

Test Method

Prior to hot functional testing, system component operability checks and control system functional tests will be performed. During hot functional testing, data will be taken to the extent practical to verify that adequate cooling is being provided to SCCW components.

Acceptance Criteria

The secondary component cooling water pumps meet or exceed design flow and pressure requirements.

System instrumentation, controls, alarms and interlocks operate as designed in response to normal or simulated input signals.

The system supplies cooling water to all associated heat exchangers. 44

Secondary compont cooling water system operates in accordance with FSAR Section 10.4.10.

TABLE 14.2-4
(Sheet 10 of 37)

8. CVCS - LETDOWN DEGASIFIER

Objective

To demonstrate the proper operation of the letdown degasifier portion of the CVCS.

Plant Conditions/Prerequisites

Prior to hot functional testing.

Test Method

Functional tests will be performed to demonstrate the operational characteristics and performance of the CVCS letdown degasifier.

Acceptance Criteria

The letdown degasifier system operates in accordance with system design. All pumps and valves function in accordance with manufacturer's specifications.

delete

44

the letdown degasifier operates in accordance with FSAR Subsection 9.3.4.2.e.11.

TABLE 14.2-4
(Sheet 11 of 37)

9. REACTOR MAKEUP WATER SYSTEM

Objective

To demonstrate the proper operation of the reactor makeup water system.

Plant Conditions/Prerequisites

Prior to hot functional testing.

Test Method

Functional testing of system components, instrumentation, and controls will be performed to demonstrate the ability of this system to transfer water to other plant systems.

Acceptance Criteria

delete

The reactor makeup water pumps and valves function in accordance with manufacturer's specifications, and the system operates in accordance with system design. 44

the reactor makeup water system operates in accordance with FSAR Section 9.2.7.

TABLE 14.2-4
(Sheet 12 of 37)

10. SAMPLING SYSTEM

Objective

To verify the proper operation of the plant sampling systems and installed analysis equipment.

Plant Conditions/Prerequisites

This test will be performed during operation of the systems which are served by the sample system. The major portion of this test will be performed during hot functional testing.

Test Method

Samnples will be drawn from each of the primary and secondary sample points to verify proper piping arrangement and function. The installed chemical analysis equipment will be operationally checked to the extent practical.

Acceptance Criteria

Sample point identification and piping arrangement has been verified.

~~Instrumentation, controls, alarms and interlocks operate as designed in response to normal or simulated input signals.~~

The sampling system operates in accordance with the design requirements of FSAR Section 9.3.2. 44

TABLE 14.2-4
(Sheet 13 of 37)

II. REACTOR COOLANT DRAIN SYSTEM

Objective

To demonstrate the proper operation of the reactor coolant drain system.

Plant Conditions/Prerequisites

Prior to hot functional testing.

Test Method

The reactor coolant drain tank, pumps and associated components will be functionally tested to verify proper performance in the various system operating modes.

Acceptance Criteria

delete

Instrumentation, controls, alarms and interlocks operate as designed in response to normal or simulated input signals.

The operability of the reactor coolant drain system has been demonstrated.

Flow paths for the system have been demonstrated. 44

The reactor coolant drain system operates in accordance with the design requirements of FSAR Section 9.3.5.2.

TABLE 14.2-4
(Sheet 14 of 37)

12. INSTRUMENT AND SERVICE AIR SYSTEMS

Objective

To demonstrate the proper operation of the instrument and service air systems.

Plant Conditions/Prerequisites

Prior to hot functional testing.

Test Methods

Functional testing of system components, instruments, and controls for the plant and containment building air system will be performed to demonstrate operability. Testing of components which perform a safety-related function will be performed during the respective system preoperational test.

Acceptance Criteria

Instrumentation, controls, alarms and interlocks operate as required in accordance with FSAR Section 9.3.1 in response to normal or simulated input signals.

~~The capacity of the air compressors meet or exceed design requirements.~~ 44

delete

TABLE 14.2-4
(Sheet 15 of 37)

13. FIRE PROTECTION SYSTEM

Objective

To demonstrate the proper operation of the fire protection system.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Methods

Tests will be performed to demonstrate proper operation of fire protection subsystem equipment and controls as follows:

a. Capacity tests of the fire pumps

b. Actuation tests of the water and halon systems

c. Proper operation of the smoke and fire detection systems

d. Fire pump house heating and ventilation

e. Fire protection interlocks with other (i.e. HVAC) plant systems

Acceptance Criteria 44

Demonstration of fire protection system performance satisfies codes and regulations per design, as stated in FSAR Subsection 9.5.1 and ~~the~~ Technical Specification~~s~~, 3.7.9.1

44

TABLE 14.2-4
(Sheet 16 of 37)

14. RADIOACTIVE GASEOUS WASTE SYSTEM

Objective

To demonstrate the proper operation of radioactive gaseous waste system components.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

Operability tests will be performed on system components, instrumentation and controls to the extent practical to verify proper operation. 44

Acceptance Criteria

delete

Instrumentation, controls, alarms and interlocks operate as designed in response to normal or simulated input signals.

The operability of the radioactive gaseous waste system has been demonstrated.

Flow paths to all system components have been demonstrated. 44

The radioactive gaseous waste system operates in accordance with FSAR Section 11.3.

TABLE 14.2-4
(Sheet 17 of 37)

15. LIQUID WASTE SYSTEM

Objective

To demonstrate the proper operation of liquid waste system components.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

Tests will be performed to the extent practical to verify the proper operation of system components, instrumentation, and controls.
Isolation of liquid waste will be demonstrated.

Acceptance Criteria

~~Instrumentation, controls, alarms and interlocks operate as designed in response to normal or simulated input signals.~~ delete

Flow paths to system components have been demonstrated.

The liquid waste system operates in accordance with FSAR Section 11.2.

44

TABLE 14.2-4
(Sheet 18 of 37)

16. SPENT RESIN SLUICE SYSTEM

Objective

To demonstrate the proper operation of the resin sluice system equipment.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

Functional tests of system components, instrumentation, and controls will be performed to verify, to the extent practical, the proper operation of resin sluice system equipment.

Acceptance Criteria

Instrumentation, controls, alarms and interlocks operate as designed in response to normal or simulated input signals.

delete

Flow paths to system components have been demonstrated.

The spent resin sluice system operates in accord with FSAR Subsection 11.4.2.3.a.

44

TABLE 14.2-4
(Sheet 19 of 37)

17. WASTE SOLIDIFICATION SYSTEM

Objective

To demonstrate the proper operation of waste solidification system equipment.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

Tests will be performed to the extent practical to verify proper operation of system components, instrumentation and controls. Solidification of test samples, representative of the expected wastes, will be performed to verify proper operation of the waste solidification system.

Acceptance Criteria

delete

Instrumentation, controls, alarms and interlocks operate as designed in response to normal or simulated input signals.

Solidification of test samples meets design requirements.

44

The waste solidification system operates in accordance with FSAR Subsection 11.4.2.4

TABLE 14.2-4
(Sheet 26 of 37)

24. ELECTRICAL PENETRATION AREA AIR CONDITIONING SYSTEM

Objective

To demonstrate proper operation of the electrical penetration area air conditioning system.

Plant Conditions/Prerequisites

Prior to and during hot functional testing.

Test Method

Tests will be performed to verify the proper operation of system components and controls for the electrical penetration area air conditioning system. During hot functional testing, data will be recorded to verify satisfactory area temperatures.

Acceptance Criteria

Instrumentation, controls and interlocks operate as designed in response to normal or simulated input signals, and area temperatures are maintained within design limits. delete

44

The electrical penetration area air conditioning system operates in accordance with FSAR Section 9.4.7.

TABLE 14.2-4
(Sheet 27 of 37)

25. TURBINE BUILDING VENTILATION

Objective

To demonstrate proper operation of the turbine building ventilation system.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

Turbine building ventilation system functional tests will be performed to verify equipment operation and air flows.

Acceptance Criteria

Instrumentation, controls and interlocks operate as designed in response to normal or simulated input signals. 44

The turbine building ventilation system operates in accordance with United Engineers & Constructors Inc., System Design Description for Turbine Building Heating and Ventilating System (SD-45).

TABLE 14.2-4
(Sheet 30 of 37)

28. COMPUTER

Objective

To demonstrate the operation of the plant computer and the associated software.

Plant Conditions/Prerequisites

Prior to initial criticality.

Test Method

Tests will be performed to demonstrate computer interface with plant parameters and computer response to changing variables. Annunciators for reactor control and engineered safety features will be demonstrated operable. 44

Acceptance Criteria

Computer interface with plant parameters and the computer response to changing parameters are in accordance with ~~design documents.~~ Computer Input/Output List, DWG-M-510004. 44

TABLE 14.2-4
(Sheet 31 of 37)

29. PRIMARY PLANT INSTRUMENTATION

Objective

To verify the initial calibration of the primary plant instrumentation.

Plant Conditions/Prerequisites

Prior to hot functional testing for specified instruments, otherwise prior to initial core loading.

Test Method

The calibration and alignment of various primary plant instrumentation (temperature, pressure, level, flow) will be performed to verify the operation of each instrument and associated setpoints. Plant calibration procedures will be utilized to the maximum extent practical.

Acceptance Criteria

The primary plant instrumentation has been calibrated to within the setpoint accuracies required by ~~plant specifications~~ Technical Specifications Tables 2.2-1 and 2.2-2.

TABLE 14.2-4
(Sheet 33 of 37)

31. SEISMIC MONITORING SYSTEM

Objective

To verify the proper operation of the seismic monitoring instrumentation.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

The seismic monitoring instrumentation will be calibrated and functionally tested.

Acceptance Critria

It has been demonstrated that the seismic monitoring system and its associated indication is operable and meets the requirements of ~~the~~ Technical Specifications, 3.3.4.3. 44

TABLE 14.2-4

(Sheet 34 of 37)

32. AC ELECTRICAL DISTRIBUTION

This testing has been incorporated into the initial construction checkout test program (Phase 1 testing).

TABLE 14.2-4
(Sheet 35 of 37)

33. COMMUNICATIONS SYSTEM

Objective

To verify proper operation of the plant page and sound powered phone systems. To verify operability of other plant communications that are utilized in the facility emergency plan.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

Communications will be verified between stations, and the outputs of speakers and amplifiers will be adjusted as required. 44

Acceptance Criteria

delete

The ability to communicate between predetermined positions, and the ability to communicate station alarms throughout the plant have been demonstrated. 44

the communications system operates in accordance with FSAR Subsections 9.5.2.2.a.2 and 9.5.2.2.a.3.

TABLE 14.2-4
(Sheet 36 of 37)

34. EMERGENCY LIGHTING

Objective

To demonstrate the operation of the emergency lighting system.

Plant Conditions/Prerequisites

Prior to loss of offsite power tests.

Test Method

Tests will be performed to demonstrate the operation of the emergency lighting systems during partial and total loss of ac power.

Acceptance Criteria

delete

~~Emergency lighting system interlocks operate as designed in response to normal or simulated input signals.~~ 44

The emergency lighting system operates in accordance with FSAR Subsection 9.5.3.2.c.

TABLE 14.2-4
(Sheet 37 of 37)

35. POLAR CRANE

Objective

To demonstrate the proper operation of the containment polar crane.

Plant Conditions/Prerequisites

Prior to hot functional tests.

Test Method

Functional tests will be performed to demonstrate proper operation of the crane and its controls. The operation of interlocks and safety devices will be verified.

Acceptance Criteria

The polar crane operates in accordance with ~~system design requirements.~~ FSAR Subsection 9.1.4.3.a.6. 44

Dynamic and static load tests of the polar crane and associated lifting and rigging equipment has been performed. Static testing at 125% of rated load and full operational testing at 100% of rated load has been performed.

TABLE 14.2-5
(Sheet 1 of 53)

STARTUP TEST ABSTRACTS

Index

TABLE 14.2-5
(Sheet 2 of 53)

Index (Cont'd)

TABLE 14.2-5
(Sheet 3 of 53)

TABLE 14.2-5
(Sheet 4 of 53)

1. STARTUP PROGRAM ADMINISTRATION

Objective

To provide general guidance for the administration of the initial startup test program and a recommended sequence for the conduct of startup testing.

Plant Conditions/Prerequisites

A list of general precautions for the overall test program are presented. General plant conditions are specified in the test sequence with specific requirements delineated in individual tests.

Test Method

General guidelines for conduct of the program are presented with specific instructions given in individual tests. The test program hold points are included in this procedure.

Acceptance Criteria

~~Acceptance criteria are specified in each individual test.~~

A recommended sequence of startup testing has been developed. Administrative guidelines for startup testing have been provided.

TABLE 14.2-5
(Sheet 5 of 53)

2. PRIMARY SOURCE INSTALLATION

Objective

To provide detailed instructions for the handling and installation of the primary sources into the required fuel assemblies.

Plant Conditions/Prerequisites

Prior to initial core loading.

Test Method

Instructions include a sequence of steps for unloading the shipping cask and installation of the sources into the respective fuel assemblies.

Acceptance Criteria

The primary sources are properly loaded in the required fuel assemblies.

TABLE 14.2-5
(Sheet 6 of 53)

3. CORE LOADING PREREQUISITES

Objectives

To provide a detailed list of plant conditions, systems, and equipment necessary for a safe and controlled core loading.

Plant Conditions/Prerequisites

Plant conditions are established as required by test instructions.

Test Method

A detailed list will summarize plant system and equipment status required prior to the start of core loading. In addition, sampling of reactor coolant and associated auxiliary systems will be performed to verify uniform boron concentration and the alignment, calibration, and response of the temporary core loading instrumentation will be verified. Final functional testing of the Reactor Protection System will be verified.

Acceptance Criteria

All requirements specified in the procedure have been ~~satisfactorily~~ completed.

TABLE 14.2-5
(Sheet 7 of 53)

4. INITIAL CORE LOADING

Objective

To provide detailed instructions for the conduct of initial core loading in a safe, controlled manner.

Plant Conditions/Prerequisites

Required preoperational testing is complete and plant systems are operational as required by the core loading prerequisites.

Test Method

A detailed loading sequence giving specific fuel assembly identification numbers and core locations will be provided with appropriate data taking requirements. Specific administrative control and core monitoring procedures to be applied during initial fuel loading will be provided.

Acceptance Criteria

The core has been properly loaded as defined by the core loading plan and a permanent record of the final as-loaded core configuration has been made.

Detailed core loading instructions, including a sequence, have been developed and executed.

TABLE 14.2-5
(Sheet 8 of 53)

5. CONTROL ROD DRIVE MECHANISM OPERATIONAL TEST

Objective

To demonstrate the proper operation of the full length control rod drive mechanisms (CRDM) and provide verification of proper slave cycler timing.

Plant Conditions/Prerequisites

Prior to initial criticality, during cold shutdown or hot standby conditions as required by the test instructions.

Test Method

During cold shutdown, the ability of the slave cycler devices to supply the proper operating signals to the CRDM stepping magnet coils will be confirmed. The proper operation of each CRDM during both cold and hot plant conditions will be verified by recording CRDM magnet coil currents and audio signals.

Acceptance Criteria

CRDM operation conforms to the requirements of proper mechanism operation as described ~~in the system technical manual.~~ in Chapter 4 of the Westinghouse Magnetic Control Rod Drive Mechanism technical manual.

TABLE 14.2-5
(Sheet 9 of 53)

6. ROD CONTROL SYSTEM

Objective

To demonstrate that the full length rod control system performs the required control and indication functions just prior to initial criticality.

Plant Conditions/Prerequisites

Prior to initial criticality at no load operating temperature and pressure.

Test Method

Testing of control rod withdrawal and insertion speeds and sequences, control functions, protective interlocks, status lights, alarms, and indication will be performed to verify proper operation.

Acceptance Criteria

The rod control system performs the required control and indication functions in accordance with ~~the applicable system technical manuals and FSAR requirements.~~ Chapter I of the Westinghouse Rod Control System technical manual.

TABLE 14.2-5
(Sheet 10 of 53)

7. ROD DROP TIME MEASUREMENT

Objective

To determine the drop time of each full length control rod under various plant conditions.

Plant Conditions/Prerequisites

Prior to initial criticality, during cold shutdown and hot standby conditions with full flow and no flow conditions in the reactor coolant system as required by the test instructions.

Test Method

During each of the applicable plant conditions, the drop time for each rod control cluster assembly will be determined. Those control rods whose drop times fall outside the two-sigma limit determined from the data for all control rods will be retested at least three times to ensure proper performance.

Acceptance Criteria

The rod drop times meet the requirements given ~~by the plant technical specifications~~. in Technical Specifications section 3.1.3.4.

TABLE 14.2-5
(Sheet 11 of 53)

8. ROD POSITION INDICATION

Objective

To verify that the rod position indication system performs the required indication and alarm functions for each individual rod and to demonstrate that each control rod operates satisfactorily over its entire range of travel.

Plant Condition/Prerequisites

Prior to initial criticality during hot standby conditions.

Test Method

Each control rod bank will be fully withdrawn and inserted in ~~20~~ 24 step increments where individual rod position indication and group step indication data is recorded. The actuation of various alarms will be verified.

Acceptance Criteria

The rod position system ~~performs the required indication and alarm function over the entire range of travel within the limits specified by the technical specifications.~~ meets the requirements of Technical Specifications 3.1.3.2.a, 3.1.3.2.b, and functions as described in the Westinghouse Digital Rod Position Indication Technical Manual.

TABLE 14.2-5
(Sheet 12 of 53)

9. PRESSURIZER SPRAY AND HEATER CAPABILITY TEST

Objective

To establish the continuous spray flow rate and to verify pressurizer spray and heater effectiveness.

Plant Conditions/Prerequisites

Prior to initial criticality during hot standby conditions.

Test Method

The spray bypass valves are adjusted for the minimum continuous spray flow. Both spray valves are opened to initiate a pressure transient which is recorded and compared to the expected pressure response. All heaters are energized to initiate a pressure transient which is recorded and compared to expected pressure response.

Acceptance Criteria

The continuous spray flow has been set, and the spray and heater effectiveness is in accordance with ~~system design requirements.~~ the Westinghouse performance curves as attached to ST-9.

TABLE 14.2-5
(Sheet 13 of 53)

10. RESISTANCE TEMPERATURE DETECTOR BYPASS LOOP FLOW VERIFICATION

Objective

To calculate the hot and cold leg bypass line flow rates necessary to provide adequate transport times, to determine the actual flow rates, and to verify the low flow alarm setpoints.

Plant Conditions/Prerequisites

Prior to initial criticality during hot standby conditions.

Test Method

The required bypass loop flows will be calculated from measurements taken on the installed RTD piping and compared to the measured bypass loop flow rates. The hot leg bypass loop isolation valves will be throttled to verify the low flow alarm setpoints.

Acceptance Criteria

~~The measured flow rates meet the design assumption for transport times as defined by the test procedure and the low flow alarms operate as required.~~

The measured flow rates meet the calculated values, with regard to transport times, as defined by the test procedure. The low flow alarms actuate at the setpoint shown in the Westinghouse Precautions, Limitations, and Setpoints manual.

TABLE 14.2-5
(Sheet 14 of 53)

11. REACTOR COOLANT SYSTEM FLOW MEASUREMENT

Objective

To measure actual reactor coolant system flow.

Plant Conditions/Prerequisites

Prior to initial criticality during hot standby conditions.

Test Method

Measurements will be made of elbow tap differential pressure and pump input power for each loop under various pump combinations. This data will be used in conjunction with the reactor coolant pump performance curves to obtain a measurement of actual reactor coolant system flow.

Acceptance Criteria

The calculated reactor coolant system flow rate is ~~conservative with respect to the value utilized in the safety analysis.~~ greater than the thermal design flow shown in Table 5.1-1 of the FSAR.

TABLE 14.2-5
(Sheet 15 of 53)

12. REACTOR COOLANT SYSTEM FLOW COASTDOWN

Objective

To measure the rate at which reactor coolant flow changes following various reactor coolant pump trips and to determine delay times associated with the loss of flow accident.

Plant Conditions/Prerequisites

Prior to initial criticality during hot standby conditions.

Test Method

The reactor coolant pumps will be simultaneously tripped from various operating configurations. Data will be recorded for coolant loop differential pressure, coolant pump breaker position, low flow trip relay output, reactor trip breaker position, and rod position indication as required by the test procedure.

Acceptance Criteria

The reactor coolant system flow coastdown ~~s~~ rate and measured time delays are conservative with respect to those ~~stated in the safety analysis.~~ used in section 15.3 of the FSAR.

TABLE 14.2-5
(Sheet 16 of 53)

13. OPERATIONAL ALIGNMENT OF NUCLEAR INSTRUMENTATION

Objective

To determine voltage settings, trip settings, operational settings, alarm settings, and overlap for the source, intermediate, and power range instrumentation.

Plant Conditions/Prerequisites

Portions of this test will be performed prior to core loading, prior to initial criticality, at hot zero power conditions, and during each of the major power plateaus (30%, 50%, 75%, 100%) as required by the test instructions.

Test Method

The nuclear instrumentation will be calibrated and functionally tested utilizing permanently installed control and adjustment mechanisms. The operational settings for the various ranges will be adjusted for their proper function during the applicable portions of the startup program.

Acceptance Criteria

The nuclear instrumentation functions ~~in accordance with the system design~~ and safety analysis requirements, and meets Technical Specification operability requirements.

The voltage settings, operational settings, alarm settings, and trip settings have been determined and are within the ranges shown ~~with~~ in Chapter 5 of the Westinghouse Nuclear Instrumentation System Technical Manual and Technical Specification 3.3.1. 44

TABLE 14.2-5
(Sheet 17 of 53)

14. OPERATIONAL ALIGNMENT OF PROCESS TEMPERATURE INSTRUMENTATION

Objective

To align the ΔT and Tavg process instrumentation.

Plant Conditions/Prerequisites

As required by the test instructions, portions of this alignment will be performed prior to initial criticality and at the 75% and 100% power plateaus.

Test Method

During plant heatup, an isothermal calibration of the RTDs and incore thermocouples will be performed.

The ΔT and Tavg instrumentation will be aligned at isothermal conditions prior to criticality and at approximately 75% power. An extrapolation of the 75% power data will be made for the 100% power values of ΔT and Tavg. At or near full power an alignment check will be performed and any necessary readjustments will be made.

Acceptance Criteria

The ΔT and Tavg process instrumentation ~~functions within the accuracies required by the safety analysis report~~ have been aligned.

TABLE 14.2-5
(Sheet 18 of 53)

15. REACTOR PLANT SYSTEMS SETPOINT VERIFICATION

Objective

To verify that initial setpoint adjustments have been made prior to plant startup and to maintain a record of setpoints which required readjustment during initial startup testing.

Plant Conditions/Prerequisites

Prior to initial criticality and following full power testing.

Test Method

Verify and record initial setpoint values and any changes performed during initial startup testing.

Acceptance Criteria

The initial setpoints are verified to be in agreement with the settings and tolerances specified by the ~~manufacturer and the technical specifications.~~ Westinghouse Precautions, Limitations and Setpoints manuals and any adjustments made during initial startup testing are recorded.

TABLE 14.2-5
(Sheet 20 of 53)

17. BORON ENDPOINT MEASUREMENTS

Objective

To determine the critical reactor coolant system boron concentration appropriate for a specific control rod endpoint configuration.

Plant Conditions/Prerequisites

The plant is critical at hot zero power conditions and at the control rod configuration specified by the startup sequence.

Test Method

The boron endpoints will be determined by measuring the boron concentration of the reactor coolant system at or near the desired control rod configuration. If required the rods are quickly moved to the desired configuration with no boron adjustment. The change in reactivity is measured and converted to an equivalent amount of boron to yield the endpoint at that rod configuration. The data obtained will be utilized to determine the boron worth.

Acceptance Criteria

The calculated boron worth ~~is consistent~~ agrees with the value contained in the ~~safety analysis~~ report.
Westinghouse Nuclear Design Report for cycle 1.

TABLE 14.2-5
(Sheet 21 of 53)

18. ISOTHERMAL TEMPERATURE COEFFICIENT MEASUREMENT

Objective

To determine the isothermal temperature coefficient.

Plant Conditions/Prerequisites

The plant is critical at hot zero power conditions and at the control rod configuration specified by the startup sequence.

Test Method

The isothermal temperature coefficient will be determined by alternately heating up and cooling down the reactor coolant system at constant rates while data on reactivity and reactor coolant temperatures are obtained.

Acceptance Criteria

The measured values of the isothermal temperature coefficient ~~are consistent with the predictions contained in the safety analysis report and meet technical specification requirements~~. meet the requirements of the Westinghouse Nuclear Design Report for cycle 1.

TABLE 14.2-5
(Sheet 22 of 53)

1?. FLUX DISTRIBUTION MEASUREMENTS AT LOW POWER

Objective

To measure the reactor core flux distribution at low power.

Plant Conditions/Prerequisites

The plant is at a low power level (less than 5%) at the control rod configuration specified by the startup sequence.

Test Method

The flux distribution will be obtained by analysis of data acquired by means of the incore movable detector system.

Acceptance Criteria

Flux map results are ~~consistent~~ in agreement with the predicted distributions contained in the ~~safety analysis~~. Westinghouse ~~Nuclear~~ Design Report for cycle 1.

TABLE 14.2-5
(Sheet 23 of 53)

20. CONTROL ROD WORTH MEASUREMENT

Objective

To determine the differential and integral reactivity worth of an individual control rod bank and to ensure proper shutdown margin.

Plant Conditions/Prerequisites

The plant is critical at zero power at the control rod configuration specified by the startup sequence.

Test Method

Control rod worths will be obtained by maintaining a constant boron addition or dilution and compensating for the reactivity change by rod movement. These changes in reactivity are recorded by a reactivity computer and analyzed to obtain the control rod worths. Analysis of the collected data will be performed to confirm adequate shutdown margin.

Acceptance Criteria

The measured control rod worths ~~are consistent with the values contained in the safety analysis.~~ are conservative with respect to the values assumed in Chapter 15 of the FSAR.

TABLE 14.2-5
(Sheet 24 of 53)

21. PSEUDO ROD EJECTION TEST

Objective

To verify the conservatism of the ejected rod analysis at zero power, ~~.~~ and at a power level greater than 10%.

Plant Conditions/Prerequisites

The test will be performed at zero power and at greater than 10% power.
~~The plant is critical at zero power conditions.~~

Test Method

The selected RCCA will be fully withdrawn while compensating for the reactivity change by boron additions as necessary. A flux map will be taken to measure the resulting flux distribution.

Acceptance Criteria

Analysis of the data obtained yields rod worths and hot channel factors which are conservative with respect to the ~~safety analysis results~~ values assumed in Section 15.4.8 of the FSAR.

TABLE 14.2-5
(Sheet 26 of 53)

23. DYNAMIC AUTOMATIC STEAM DUMP CONTROL

Objective

To verify proper operation of the Tavg steam dump control system, to demonstrate the dynamic characteristics of the controller, and to obtain the final settings for steam pressure control of the condenser dump valves.

Plant Conditons/Prerequisites

The plant is critical at no load temperature and pressure.

Test Method

Reactor power will be increased to approximately 10% by rod withdrawal and steam dump with the turbine in both a tripped and reset condition to demonstrate proper operation and the setpoint adequacy of the Tavg controllers. With the steam dump system in pressure control, power will be increased to demonstrate proper operation of the steam header pressure controller. Any required adjustments of controller gains or setpoints will be made as necessary.

Acceptance Criteria

The steam dump control system operates as described in FSAR section 7.7.1.8, ~~in accordance with the system design requirements,~~ and is capable of maintaining the reactor coolant system temperature at the ~~desired reference value~~ no load temperature. 44

TABLE 14.2-5
(Sheet 27 of 53)

24. AUTOMATIC REACTOR CONTROL

Objective

To verify the capability of the reactor control system to maintain the reactor coolant average temperature within acceptable limits.

Plant Conditions/Prerequisites

The plant is stable at the 30% power plateau.

Test Method

Tavg will be varied from the Tref setpoint and the control system will be placed in automatic to verify its ability to return plant temperature to the reference value.

Acceptance Criteria

The reactor control system functions ~~in accordance with its design specifications.~~ as described in FSAR section 7.7.1.1.

TABLE 14.2-5
(Sheet 28 of 53)

25. AUTOMATIC STEAM GENERATOR LEVEL CONTROL

Objective

To verify the stability of the automatic steam generator level control system following simulated transients at low power and to verify the operation of the main feed pump control system.

Plant Conditions/Prerequisites

The plant is stable at the 30% power plateau.

Test Method

Steam generator level transients will be simulated to verify proper level control response. The operability of the main feed pump control system will be verified by manipulation of the controllers and by simulating selected input signals.

Acceptance Criteria

The steam generator level and main feedwater pump control systems function ~~as required by their design specifications.~~

as described in FSAR section 7.7.1.7

TABLE 14.2-5
(Sheet 29 of 53)

26. THERMAL POWER MEASUREMENT AND STATEPOINT DATA COLLECTION

Objective

To obtain various primary and secondary plant temperatures, pressures, and flows and to perform a calorimetric determination of reactor power, and verify that the main steam and feedwater systems perform as described in the FSAR.

Plant Conditions/Prerequisites

This test will be performed at each of the major power plateaus (30%, 50%, 75%, 100%) as required by the startup test sequence.

Test Method

With the plant stable at the required power level, data will be collected to allow calculation of thermal power. Additional statepoint data will be collected to provide baseline plant operating temperatures and pressures. Some of the data collected will be utilized by other tests to align various plant instruments.

Acceptance Criteria

The ~~required~~ data specified in the procedure has been collected and the calorimetric performed. Main Steam and Feedwater Systems operate as described in FSAR section 10.4.7.

TABLE 14.2-5
(Sheet 30 of 53)

27. STARTUP ADJUSTMENTS OF REACTOR CONTROL SYSTEM

Objective

To determine the Tavg program resulting in the optimum plant efficiency without exceeding plant pressure and temperature limitations.

Plant Conditions/Prerequisites

Portions of this test will be performed at hot zero power and various major power plateaus (50%, 75%, 100%) as required by the startup test sequence.

Test Method

Analysis of system temperature and pressure data obtained by this or other tests at the required plant conditions will be utilized to provide a basis for the adjustment of the reactor control system.

Acceptance Criteria

The reactor control system has been adjusted to provide optimum plant performance without exceeding ~~Technical Specifications limitations~~. the requirements of Technical Specification 3.2.5. 44

TABLE 14.2-5
(Sheet 31 of 53)

28. CALIBRATION OF STEAM AND FEEDWATER FLOW INSTRUMENTATION

Objective

To calibrate the steam and feedwater flow instruments.

Plant Conditions/Prerequisites

Portions of this test will be performed at hot zero power conditions and at selected major power plateaus (75%, 100%) as required by the startup test sequence.

Test Method

Feedwater flow, as determined by special test instrumentation, will be compared to steam and feedwater flow readings from plant instrumentation. Adjustments of plant instrumentation will be made to obtain a best fit to the data from the special test instrumentation.

Acceptance Criteria

The steam and feedwater flow instrumentation has been calibrated. ~~to within a specified accuracy of the test instrumentation.~~

TABLE 14.2-5
(Sheet 32 of 53)

29. CORE PERFORMANCE EVALUATION

Objective

To provide instructions for obtaining incore movable detector flux and thermocouple maps at power and to verify proper core performance margins.

Plant Conditions/Prerequisites

This test will be performed at selected power plateaus (30%, 50%, 75%, 90%, 100%) as required by the startup test sequence.

Test Method

Flux distribution data will be obtained utilizing the movable detector system. Incore thermocouple data will be obtained using the analog readout instrument or process computer. This data will be analyzed to indicate core performance.

Acceptance Criteria

~~The flux map results are consistent with the expected core performance contained in the safety analysis report.~~

The flux map results, including DNBR, Radial and Axial power peaking factors, and quadrant power tilt, meet the requirements of Technical specifications 3.2.2, 3.2.4, and 3.2.5.

TABLE 14.2-5
(Sheet 33 of 53)

30. POWER COEFFICIENT MEASUREMENT

Objective

To determine the power coefficient of reactivity.

Plant Conditions/Prerequisites

This test will be performed at selected power plateaus (30%, 50%, 75%, 100%) as specified by the startup test sequence.

Test Method

Generator load will be varied and data will be collected for Δ T, Tavg, reactivity and reactor power. Analysis of the relative changes of these parameters will be used to determine the power coefficient. From this the integral power defect and Doppler-only power coefficient can be obtained.

Acceptance Criteria

The measured values of power coefficient of reactivity are ~~consistent~~ conservative with respect to the values contained in the ~~safety analysis report.~~ Westinghouse Nuclear Design Report for Cycle 1.

TABLE 14.2-5
(Sheet 34 of 53)

31. STATIC ROD DROP AND FLUX ASYMMETRY EVALUATION

Objective

To demonstrate the response of the incore and excore instrumentation systems to a misaligned RCCA and to demonstrate that core limits are not exceeded with a misaligned rod.

Plant Conditions/Prerequisites

The plant will be stable at the 50% power plateau.

Test Method

A selected RCCA will be fully inserted into the core while a boron reactivity compensation adjustment is made. Data will be taken periodically from the excore and incore instrumentation to determine their response to the misaligned rod. A flux map will be taken with the rod fully inserted to allow analysis of the core parameters

Acceptance Criteria

The incore and excore instrumentation are capable of detecting a misaligned RCCA and the analysis of ~~the~~ flux distribution due to a dropped rod is conservative with respect to ~~the safety analysis report.~~ FSAR section 15.4.3

TABLE 14.2-5
(Sheet 36 of 53)

33. SHUTDOWN FROM OUTSIDE THE CONTROL ROOM

Objective

To demonstrate the capability to shutdown and maintain the reactor in a hot standby condition from outside the control room and to demonstrate the potential capability for placing the plant in a cold shutdown condition.

Plant Conditions/Prerequisites

The plant is at a stable power level of equal to or greater than 10% power.

Test Method

The plant will be tripped and maintained in the stable hot standby condition for at least 30 minutes. The ability to cooldown from hot standby will also be demonstrated. The plant will be placed on the residual heat removal system and a 50°F cooldown will be performed.

Acceptance Criteria

The plant is ~~successfully~~ placed in hot standby, and the cooldown demonstration is ~~successfully~~ performed.

TABLE 14.2-5
(Sheet 37 of 53)

34. LOAD SWING TEST

Objective

To verify proper plant response, including automatic control system performance, to 10% step load changes.

Plant Conditions/Prerequisites

This test will be initiated from steady state conditions at selected power plateaus (30%, 50%, 75%, 100%) as required by the startup test sequence.

Test Method

Turbine generator output will be changed as rapidly as possible to achieve an approximate 10 percent load decrease or increase, as required. Various plant parameters will be recorded or observed during the transient.

Acceptance Criteria

The following criteria will be used to determine successful test completion:

1. Reactor or turbine must not trip.

2. Safety injection is not initiated.

3. Neither steam generator relief valves nor safety valves lift.

4. Neither pressurizer relief valves nor safety valves lift.

5. No manual intervention should be ~~required~~ necessary to bring plant conditions to steady state.

6. Plant parameters should not incur sustained or diverging oscillations.

7. Nuclear power overshoot (undershoot) must be less than 3 percent for load increase (decrease).

   Note: Failure to meet these criteria does not constitute a need for stopping the test program, but correction of any deficiencies should be accomplished as required consistent with the plant schedule.

TABLE 14.2-5
(Sheet 38 of 53)

35. LARGE LOAD REDUCTION TEST

Objective

To verify proper plant response, including automatic control system performance, to a 50% load reduction.

Plant Conditions/Prerequisites

This test will be initiated from steady state conditions at the 75% and 100% power plateaus.

Test Method

Turbine generator output will be reduced as rapidly as possible to achieve an approximate 50 percent load reduction. Various plant parameters will be observed or recorded during the transient.

Acceptance Criteria

The following criteria will be used to determine successful test completion:

1. Reactor or turbine must not trip.
2. Safety injection is not initiated.
3. Steam generator safety valves should not lift.
4. Pressurizer safety valves should not lift.
5. No manual intervention should be ~~required~~ necessary to bring plant conditions to steady state.

Note: Failure to meet these criteria does not constitute a need for stopping the test program, but correction of any deficiencies should be accomplished as required consistent with the plant schedule.

TABLE 14.2-5
(Sheet 40 of 53)

37. STEAM GENERATOR MOISTURE CARRYOVER MEASUREMENT

Objective

To determine the moisture carryover performance of the steam generators.

Plant Conditions/Prerequisites

This test will be performed at selected power plateaus (75%, 90%, 100%) as required by the startup test sequence.

Test Method

A tracer will be injected into the steam generator and an analysis of selected water and steam samples will be performed. These results will be used to calculate the steam generator moisture carryover.

Acceptance Criteria

~~The measured steam generator moisture carryover is less than or equal to the warranted value of moisture carryover.~~

The steam generator moisture carryover has been calculated.

TABLE 14.2-5
(Sheet 41 of 53)

38. UNIT TRIP FROM 100 PERCENT POWER

Objective

To verify the ability of the plant to sustain a trip from 100% power and return to stable conditions following the transient, and to determine the overall response time of the reactor coolant hot leg resistance temperature detectors (RTD).

Plant Conditions/Prerequisites

This test will be initiated from steady state conditions at the 100% power plateau.

Test Method

A plant trip will be initiated by tripping the generator main breaker. Plant response will be monitored and plant parameters will be recorded as required. This data will be evaluated to determine if changes in control system settings are required to improve system response.

Acceptance Criteria

The following criteria will be used to determine acceptance:

1. Pressurizer safety valves shall not lift.
2. Steam generator safety valves shall not lift.
3. Safety injection is not initiated.
4. The overall hot leg RTD response time is conservative with respect to the value utilized ~~in the safety analysis report.~~ FSAR Chapter 15.

TABLE 14.2-5
(Sheet 42 of 53)

39. STATION BLACKOUT TEST

Objective

To demonstrate starting of emergency diesels and proper sequencing of loads following a main generator trip without an available source of offsite power.

Plant Conditions/Prerequisites

The plant is at a stable power level of equal to or greater than 10% power.

Test Method

Generator output breakers will be tripped resulting in a reactor trip with no offsite power available. The starting of the emergency diesel generators and overall plant response will be monitored.

Acceptance Criteria

The plant responds to the concurrent trip and loss of offsite power in accordance with the criteria ~~established in the safety analysis report.~~ shown in FSAR section 15.2.6

TABLE 14.2-5
(Sheet 44 of 53)

41. RADIATION SURVEY

Objective

To determine dose rate levels at pre-selected locations throughout the plant, ~~to verify shielding effectiveness,~~ and to identify high radiation areas. To verify operability of selected area radiation monitors.

Plant Conditions/Prerequisites

The plant is at steady state conditions at selected power levels (HZP, 50%, 100%) as specified by the startup test sequence.

Test Method

Radiation surveys will be made during steady state plant conditions to determine gamma and neutron dose levels at preselected points throughout the plant. The response of area radiation monitors will be compared with the survey readings.

Acceptance Criteria

Neutron and gamma radiation dose levels are consistent with the values contained in the safety analysis report. Radiation monitor response is consistent with the survey results.

Neutron and gamma radiation dose levels have been measured at various pre-selected locations. The response of selected area radiation monitors agrees with values obtained during ST-41. High radiation areas have been identified.

TABLE 14.2-5
(Sheet 45 of 53)

42. WATER CHEMISTRY CONTROL

Objective

To verify that water chemistry requirements can be maintained at various plant conditions and to demonstrate proper operation of in-plant chemical analysis instrumentation.

Plant Conditions/Prerequisites

This test will be performed prior to criticality and at major power plateaus (HZP, 30%, 50%, 75%, 100%) as specified by the startup test sequence.

Test Method

Samples of reactor coolant will be analyzed to verify that primary chemistry requirements can be maintained. During power operation, samples of secondary plant water will also be obtained to verify that chemistry specifications are met. These results will be compared with those from selected analyzers to demonstrate proper operation.

Acceptance Criteria

Water chemistry is maintained within limits established by the manufacturer and listed in the technical specifications. Analyzer responses are consistent with analysis results.

Objective

To demonstrate that chemical and radiochemical control and analysis systems function as described in the FSAR and verify that water chemistry requirements can be maintained at various plant conditions.

Acceptance Criteria

Control and alarm systems function as described in FSAR section 9.3.4. and water chemistry is maintained within limits established by Westinghouse SIP 5-4 and Technical Specification 3.4.8 and 3.7.1.4. Analyzer responses agree with analyzer results.

TABLE 14.2-5
(Sheet 46 of 53)

43. PROCESS COMPUTER

Objective

To verify the process computer is receiving correct inputs from process variables and performing related calculations correctly.

Plant Conditions/Prerequisites

This test will be performed at major power plateaus (30%, 50%, 75%, 100%) as specified by the startup test sequence.

Test Method

Computer outputs for various plant parameters will be compared with the values indicated by plant process instrumentation.

Acceptance Criteria

~~The computer outputs and process instrumentation values agree within specified accuracies.~~

The process computer inputs and process instrumentation agree and the related calculations are being performed correctly.

TABLE 14.2-5
(Sheet 47 of 53)

44. VIBRATION AND LOOSE PARTS MONITOR

Objective

To obtain baseline data for the vibration and loose parts monitoring (VLPM) system and to establish the alert levels for power operation.

Plant Conditions/Prerequisites

This test will be performed prior to initial criticality at cold and hot plant conditions and at selected power plateaus (50%, 100%) as specified by the startup test sequence.

Test Method

Vibration data will be obtained at various plant conditions to establish a set of baseline data for the plant. Analysis of this data will be used to verify the proper setting of the alert limits.

Acceptance Criteria

Baseline data has been obtained and ~~proper setting of~~ the alert limits ~~has~~ have been ~~verified.~~ established.

TABLE 14.2-5
(Sheet 48 of 53)

45. PROCESS AND EFFLUENT RADIATION MONITORING SYSTEM

Objective

To demonstrate the proper operation of the process and effluent radiation monitoring systems.

Plant Conditions/Prerequisites

This test will be performed at selected power plateaus (HZPL, 50%, 100%) as specified by the startup sequence.

Test Method

The response of various process and effluent monitors including selected airborne radioactivity monitors will be compared to the analysis of actual samples obtained from the specific monitoring points.

Acceptance Criteria

~~The process and effluent monitor responses are consistent with sample analysis results.~~

The process and effluent monitoring systems operate in accordance with the criteria given in FSAR Section 11.5.

TABLE 14.2-5
(Sheet 49 of 53)

46. VENTILATION SYSTEM OPERABILITY TEST

Objective

To demonstrate the ability of various ventilation and air conditioning systems to maintain proper environmental conditions in various equipment spaces under operating conditions.

Plant Conditions/Prerequisites

This test will be performed at the 50% and 100% power plateaus.

Test Method

Ambient temperatures will be monitored in selected plant location including areas containing engineered safety feature equipment to ensure proper environmental conditions are maintained.

Acceptance Criteria

The ventilation systems are capable of maintaining equipment space environmental conditions ~~consistent with the design specifications.~~

as described in FSAR section 9.4

TABLE 14.2-5
(Sheet 50 of 53)

47. MAIN STEAM LINE ISOLATION VALVE CLOSURE TEST

Objective

~~To demonstrate the dynamic response of the plant to the automatic closure of all main steam line isolation valves (MSIV) and to verify operability and response times of the main steam line isolation valves.~~

To demonstrate the ability of each main steam isolation valve (MSIV) to close under steam flow.

Plant Conditions/Prerequisites

This test will be initiated from steady state conditions at the 30% power plateau.

Test Method

All MSIV's will be closed simultaneously while the plant response is observed. Selected plant parameters will be recorded including MSIV response times.

Acceptance Criteria

~~Plant dynamic response and~~ MSIV closure times are consistent with the ~~design~~ requirements contained in ~~the safety analysis report~~. Technical Specification 4.7.1.5.

TABLE 14.2-5
(Sheet 51 of 53)

48. TURBINE GENERATOR STARTUP TEST

Objective

To provide instructions for the initial startup and synchronization of the turbine generator and to obtain operational data for the turbine generator during the initial startup and at various loads.

Plant Conditions/Prerequisites

Portions of this test will be performed at selected power plateaus (10%, 30%, 50%, 75%, 100%) as specified by the startup sequence.

Test Method

Detailed instructions will be provided for the initial startup and synchronization of the turbine generator. Data will be recorded for the various turbine parameters during the startup and through the power ascension.

Acceptance Criteria

The turbine generator is ~~successfully~~ synchronized to the grid. ~~and operates within the manufacturer's guidelines.~~

Operational data has been collected as specified by ST-48.

TABLE 14.2-5
(Sheet 52 of 53)

49. CIRCULATING WATER SYSTEM THERMAL-HYDRAULIC TEST

Objective

To verify the thermal-hydraulic characteristics of the circulating water system and to determine the overall plant effects during the intake tunnel heat treatment mode of operation.

Plant Conditions/Prerequisites

This test will be performed at selected power plateaus as specified by the startup sequence.

Test Method

Plant power level will be adjusted as required, by local environmental conditions and the circulating water system will be placed in the backflush mode of operation. Condenser discharge temperature will be increased to a specified level by adjusting the inlet/recirculation valves. During these operations, data will be recorded for circulating water temperatures, pressures, levels, plant power levels, and main condenser vacuum. The circulating water system will then be returned to normal operation.

Acceptance Criteria

The circulating water system is ~~successfully~~ placed in the heat treatment mode of operation and maintained in this condition for the ~~times required~~ duration specified by the test procedure.

TABLE 14.2-5
(Sheet 53 of 53)

50. MOVABLE INCORE DETECTOR SYSTEM

Objective

To verify proper installation and operation of the movable incore detector system.

Plant Conditions/Prerequisites

Prior to initial criticality and during low power physics testing.

Test Method

Testing will be performed on the movable incore detector system to verify system performance in all modes of operation. System indexing will be checked using a dummy cable, and system response will be verified using simulated detector inputs. The system will be operationally checked to ensure free detector passage in all thimbles. The final limit switch settings will be made during initial core flux mapping.

Acceptance Criteria

The movable incore detector system has been demonstrated operational and meets Technical Specification ~~requirements~~. 3.3.4.2. 44