Millstone Power Station Unit 3
Safety Analysis Report

Chapter 14: Initial Test Program

CHAPTER 14—INITIAL TEST PROGRAM

Table of Contents

CHAPTER 14—INITIAL TEST PROGRAM
Table of Contents (Continued)

CHAPTER 14—INITIAL TEST PROGRAM
Table of Contents (Continued)

CHAPTER 14—INITIAL TEST PROGRAM
Table of Contents (Continued)

CHAPTER 14–INITIAL TEST PROGRAM

List of Tables

NOTE: REFER TO THE CONTROLLED PLANT DRAWING FOR THE LATEST REVISION.

CHAPTER 14–INITIAL TEST PROGRAM

List of Figures

CHAPTER 14 - INITIAL TEST PROGRAM

14.1 SPECIFIC INFORMATION TO BE INCLUDED IN PRELIMINARY SAFETY ANALYSIS REPORTS

This section is not applicable; Section 14.2 covers the specific information for the Final Safety Analysis Report.

14.2 SPECIFIC INFORMATION TO BE INCLUDED IN FINAL SAFETY ANALYSIS REPORT

14.2.1 SUMMARY TEST PROGRAM AND OBJECTIVES

14.2.1.1 Discussion

The test program begins when system construction has been completed by Stone & Webster Engineering Corporation (SWEC) and the system is turned over to Northeast Nuclear Energy Company (NNECo.) for testing. The test program consists of nine phases of testing (Figure 14.2–1). The objectives of the test program are to provide assurance that:

1. The plant has been properly designed and constructed and is ready to operate in a manner that will not endanger the health and safety of the public.

2. The plant procedures have been evaluated and demonstrated to be adequate.

3. The operating organization is knowledgeable about the plant and procedures and is prepared to operate the plant in a safe manner.

14.2.1.2 Description

Construction Tests

Construction tests are not part of the NNECo. initial test program. These tests will be prepared and controlled in accordance with applicable SWEC procedures and are used to verify that construction is complete.

Phase I - Initial Inspection and Component Testing

These tests will be conducted to ensure that equipment and components are ready for operation. Where the same type of testing is repeated on similar electrical, instrumentation, or mechanical equipment, generic procedures will be used. The Phase I tests will list the generic procedures to be used on components or equipment.

Phase II - Preoperational or Acceptance Testing

These tests demonstrate, to the extent practical, the capability of structures, systems, and components to meet performance requirements to satisfy design criteria. Additionally, these tests, which are normally conducted at ambient temperature, verify the operational reliability of systems, components, and protective devices to insure that equipment can be operated safely during integrated plant testing.

The Phase II test program also provides assurance that equipment and systems, important to the safety of the plant, employees, and general public, perform in accordance with design criteria in order that initial fuel loading, initial criticality, and subsequent power operation can be fully undertaken.

Preoperational Tests

Preoperational testing is performed to verify that the construction and installation of equipment performing nuclear safety functions have been accomplished in accordance with the design and, to the extent practical, that this equipment meets the performance requirements of the design criteria.

In general, preoperational testing is performed on QA Category I systems and structures and on those Non-Category I systems that normally handle radioactive materials or provide direct support of a Category I system.

Test procedures include, as appropriate, manual system or component operation, operation of subsystems and components within systems, automatic operation of systems and components, operation in all alternate or secondary modes of control, and operation and verification tests to demonstrate expected operation following loss of power sources and failures of components for which the systems are designed to remain operational. Preoperational test procedures also include, as appropriate, verification of proper functioning of instrumentation and controls, permissive and prohibit interlocks, and equipment protective devices whose malfunction or premature actuation may unnecessarily shut down or defeat the operation of systems or equipment.

Acceptance Tests

Acceptance tests are normally performed on Non-Category I systems that are not preoperationally tested.

Acceptance tests are performed to demonstrate to NNECo. the acceptability of systems as designed and constructed to meet appropriate design and warranty requirements. The testing method and format for acceptance test procedures is similar to that employed for preoperational testing.

Wherever practical, the plant operating staff uses facility operating and emergency procedures to perform these tests under the direction of startup engineers in order to familiarize plant personnel with the facilities and procedures and to verify the technical adequacy of the procedures. The plant operating staff and procedures will be used to support all following phases of the test program.

Phase III - Precore Hot Functional Testing

These tests are conducted at normal operating temperature and pressure to ensure that normal and emergency core cooling systems perform in accordance with design criteria. These tests provide assurance that when the fuel is loaded into the core it can be cooled under all plant conditions.

The precore hot functional test raises the primary plant from ambient to normal operating temperature and pressure, stopping at specific temperature plateaus, and performing specified evaluations (i.e., pressurizer bubble, coolant flow and vibration checks, primary plant chemistry analysis, etc.). In conjunction with this test, a thermal expansion test will be conducted on the reactor coolant and main steam systems.

Completion and acceptance of Phase II and precore hot functional tests are prerequisites to fuel loading.

Phase IV - Initial Fuel Loading

The plant operating staff, under the direction of the plant Reactor Engineer, will use plant procedures to perform the initial fuel loading. These procedures will address necessary precautions to preclude inadvertent criticality.

Phase V - Post Core Hot Functional Testing

This test will essentially consist of control rod drive mechanism coupling, rod cluster control assembly (RCCA) position checks, RCCA drop tests, and the reactor coolant system flow, loss of flow, and flow coast down tests.

These tests validate design criteria used in accident analyses which ensure protection of the general public in an accident situation. These tests also ensure the reliability of the rod drive system.

Phase VI - Initial Criticality

The purpose of the initial approach to criticality procedure is to provide a safe and controlled method of achieving initial reactor criticality. The initial approach is performed by primary coolant boron dilution with control rods in the nearly fully withdrawn position at a temperature and pressure specified in the procedure.

Phase VII - Low Power Physics Testing

The purpose of low power physics testing program is to obtain as- built reactor characteristics and to verify W predictions and physics design parameters.

Completion and acceptance of low power physics testing are prerequisites to power ascension testing.

Phase VIII - Power Ascension Testing

The power ascension test procedures describe the detailed steps required for the initial power startup from completion of the low power physics test phase to full rated power level, including those tests necessary to demonstrate safe plant operation within design specifications. It is planned to increase power in specified discrete steps. The test procedures will specify if any necessary prerequisites are to be met before proceeding to the next power level. A NNECo. startup engineer, acting as test supervisor, will assure that the prerequisites are met.

Phase IX - Warranty Run

When Phase VIII is completed, the plant is operated for a period of at least 100 hours at full power to determine the performance of all systems and equipment under sustained full power conditions. Upon satisfactory completion of Phase IX, the startup test program is complete and the plant commences the in-service phase.

14.2.1.3 Retest Requirements

All rework or modifications performed on a component or system to correct test deficiencies are followed by retesting to assure validity of the original test results. All previously performed tests are reperformed on the applicable section of the system unless specifically waived by the Joint Test Group (JTG).

14.2.2 ORGANIZATION AND STAFFING

14.2.2.1 Discussion

NNECo. is responsible for controlling, directing, and ensuring that all phases of unit testing are accomplished in accordance with established criteria. The organization established to meet the responsibility is shown on Figure 14.2–2.

The Millstone 3 Superintendent is responsible for ensuring that the preoperational and startup test phase is properly accomplished and accepted. The NNECo. Startup Department is responsible to the Millstone 3 Superintendent for planning and executing the startup test program. The maintenance department, instrumentation and control department, and production test department provide personnel to support the startup department during the initial test program. The operations department conducts all system testing operations under the direction of the startup department in accordance with approved procedures.

The Plant Operations Review Committee, consisting of NNECo. supervisory personnel, provides recommendations on the safe operation of the plant to the Millstone 3 Superintendent. The Joint Test Group (JTG) consists of a member of the startup department and of each of the principal plant design organizations and is chaired by the Millstone 3 Superintendent. The JTG administratively controls the conduct of the initial test program.

14.2.2.2 Duties and Responsibilities

The duties and responsibilities of individuals and organizations involved in the startup of Millstone 3 are discussed in the following paragraphs. In general, only those duties and responsibilities which are directly related or unique to the startup test program are mentioned. Millstone Administrative Control Procedures (ACPs) describe the duties of NNECo. supervisory personnel.

14.2.2.2.1 Plant Operations Review Committee

The Plant Operations Review Committee (PORC) consists of NNECo. supervisory personnel and is chaired by the Millstone 3 Superintendent. In addition to reviewing and accepting all plant operating procedures, the PORC has the following duties:

1. Review and approve the Startup Manual.

2. Review and approve Phase II through IX test procedures and changes thereto.

3. Review and accept the test results for Phase II through IX test procedures.

14.2.2.2.2 The Joint Test Group (JTG)

The JTG is advisory to the Station Superintendent for the proper conduct of the startup test program. It consists of representatives from the major groups concerned with the design, construction, and startup of Millstone 3. It meets routinely and as often as necessary, depending on the work load, but not less than once per month (starting at a date determined by the Chairman).

The JTG operates in accordance with a charter adopted by the Group and approved by the Station Superintendent as follows:

1. Control the administration of the startup test program commencing the preoperational (Phase II) testing, by ensuring that the startup test program is conducted in accordance with the Startup Manual and approved procedures.

2. Meet, as required, to ensure the safe and proper sequencing of the test program.

3. Review and approve all preoperational and subsequent test procedures.

4. Approve the release of preoperational and subsequent test procedures for execution, review system deficiencies prior to procedure release, and review and disposition all deficiencies prior to Phase IV release.

5. Approve changes to preoperational and subsequent test procedures.

6. Review and approve the results of preoperational and subsequent tests performed under the startup test program.

7. Ensure that all preoperational and subsequent test deficiencies are resolved.

8. Recommend the return of systems or portions thereof to SWEC Construction in order to correct deficiencies.

14.2.2.2.3 NNECo. Station Superintendent

The Station Superintendent has the ultimate responsibility for ensuring that a safe, thorough, and efficient startup test program is conducted. He must also ensure that Senior Management is properly informed of the status of the startup test program and all significant activities.

14.2.2.2.4 Millstone 3 Superintendent

The Millstone 3 Superintendent has the following responsibilities and duties:

1. Responsible to the Station Superintendent for ensuring that a safe, thorough, and efficient startup test program is conducted in accordance with the Startup Manual and the Northeast Utilities Quality Assurance Program

2. Serve as Chairman of the Millstone 3 PORC

3. Serve as Chairman of the JTG or designate a member of the plant staff to act as Chairman in his absence

4. Keep the Station Superintendent informed of the status of the startup test program

5. Prepare plant procedures

6. Review and approve the Startup Manual and ensure that the test program is performed in accordance with the manual

7. Ensure that sufficient personnel and equipment are available to execute each phase of the startup test program

14.2.2.2.5 SWEC Lead Advisory Engineer

During final completion of construction activities, the Lead Advisory Engineer assumes prime responsibility for directing the completion of those activities required to bring systems or components to a condition suitable for turnover to NNECo. for testing.

In addition, the Lead Advisory Engineer assures satisfactory performance of the following activities:

1. Review and advise NNECo. management of the progress of construction and engineering activities

2. Ensure that construction activities are complete and that the system or portion thereof is ready for turnover to NNECo.

3. Provide an interface between NNECo. and SWEC Construction and coordinate remedial work as required

4. Assist the NNECo. Startup Supervisor in the coordination of construction and vendor personnel to support the startup test program

5. Provide adequate qualified personnel to support the NNECo. Startup Department to ensure a safe and efficient startup test program

6. Serve as a member of JTG

7. Evaluate test results

8. Assist in preparation of the final startup report

9. Provide technical direction of the pressure test program

14.2.2.2.5.1 SWEC Startup Test Group

The SWEC Startup Test Group consists of the Lead Advisory Engineer, a group of advisory engineers (“system turnover engineers”), and a group of startup engineers. The Startup Test Group provides technical advice and consultation on all matters relating to the design, operation, and testing of SWEC supplied systems and equipment.

14.2.2.2.6 Westinghouse (W) Startup Manager

The W Startup Manager performs the following duties:

1. Serve as a member of the JTG

2. Review operating and testing procedures pertaining to W supplied systems and equipment changes thereto

3. Provide technical direction on all matters relating to the operation and testing of W supplied systems and equipment

4. Provide adequate qualified support personnel, including vendor representatives, as necessary, to ensure a safe and efficient startup test program

5. Evaluate test results for W supplied equipment

6. Coordinate the resolution of any problems dealing with NSSS equipment

7. Assist in the preparation of the final startup report

14.2.2.2.6.1 Westinghouse Site Organization

The Westinghouse Site Organization provides technical advice and consultation on all matters relating to the design, operation, and testing of W supplied systems and equipment.

14.2.2.2.7 Millstone Startup Supervisor

The Millstone Startup Supervisor has the following duties:

1. Serve as a member of the JTG; act as Chairman in the absence of the Millstone 3 Superintendent
2. Responsible to the JTG and the Millstone 3 Superintendent for implementing the startup test program
3. Coordinate the preparation, review, control, and distribution of all test procedures
4. Coordinate the transfer of systems, or portions thereof, from SWEC to NNECo. for initial testing
5. Coordinate the testing functions of NNECo. Maintenance, Instrument, Engineering, and Operations Departments and the NUSCo. Production Test Group
6. Ensure timely completion of test prerequisites and notification to the JTG of readiness to perform preoperational and subsequent tests
7. Ensure that sufficient personnel and equipment are available to execute each test of the initial test program
8. Notify the JTG of occurrence which will significantly delay testing or startup, which will affect the safety of personnel or equipment, including significant deficiencies, or any other occurrences which will require the immediate attention or action of the JTG
9. Coordinate the review and evaluation of all test procedures
10. Coordinate, as appropriate, the flushing and hydrostatic testing of the systems
11. Coordinate the resolution of design, construction, or testing deficiencies
12. Supervise the transfer of systems or portions thereof to SWEC Construction for further work or correction of deficiencies
13. Review and approve the test results of Phase I through IX test procedures
14. Review results of installation inspections, ensure that NNECo. transfer inspection is performed, and be responsible for reviewing and concurring with the results of the transfer inspections
15. Maintain a log of plant deficiencies

16. Coordinate the preparation, review and issue of the Millstone 3 Startup Manual and all changes thereto

17. Coordinate the preparation of the Millstone 3 Startup Report

14.2.2.2.7.1 Millstone 3 Startup Engineers

The Startup Engineer assists the Startup Supervisor in the performance of his duties; prepares test procedures; supervises the performance of tests, ensuring that the tests are properly conducted in accordance with the test procedures, applicable operating procedures, and the Startup Manual; and coordinates the startup testing of assigned systems, as well as pursuing deficiency status reporting and resolution.

14.2.2.2.8 Millstone 3 Staff

14.2.2.2.8.1 Millstone 3 Engineering Staff

Staff Engineers will be assigned to the Startup Supervisor to assist startup engineers in the performance of tests, to correct assigned deficiencies, and to provide engineering support to other NNECo. departments.

14.2.2.2.8.2 Reactor Engineer

The Reactor Engineer is responsible for all plant nuclear physics work and nuclear test programs associated with the core and nuclear plant; has primary responsibility for initial core loading, low power physics testing, and power ascension test programs; and, for initial startup testings, will review designated test results prior to giving permission to proceed to the next test step.

14.2.2.2.8.3 Operations Supervisor

The Operations Supervisor coordinates those portions of Phase I testing which are assigned to the Operations Department; supports preoperational and initial startup testing with appropriate personnel assignments; and administers the tagging program.

14.2.2.2.8.4 Maintenance Supervisor

The Maintenance Supervisor reviews test procedures for approval as the applicable department head; provides sufficient trained personnel to support the Startup Department during the initial test program; and, following system turnover, assumes responsibility for the repair and maintenance of plant mechanical and certain electrical equipment.

14.2.2.2.8.5 Instrumentation and Controls Supervisor

The Instrumentation and Controls Supervisor reviews test procedures for approval as the applicable department head; provides sufficiently trained personnel to support the Startup

Department during the initial test program; and, following system turnover, assumes responsibility for the repair and maintenance of plant instrumentation and control equipment.

14.2.2.2.9 NUSCo. Production Test Field Supervisor

The NUSCo. Production Test Field Supervisor reviews and performs Phase I electrical test procedures; repairs and maintains electrical distribution equipment following turnover; and performs or participates in preoperational testing of major electrical generation and power distribution systems.

14.2.2.2.10 NNECo. QA Supervisor

The NNECo. QA Supervisor performs the quality related activities outlined in Chapter 17 commencing with system turnover.

14.2.2.2.11 NUSCo. Project Site Representative

The NUSCo. Project Site Representative provides technical guidance and assistance on matters pertaining to the startup test program; coordinates the resolution of design changes identified during testing; and takes appropriate action on potential significant deficiency reports.

14.2.2.3 Minimum Qualifications

The following details the minimum qualifications of the personnel comprising the Startup Organization.

14.2.2.3.1 Unit Superintendent

Refer to Section 13.1.

14.2.2.3.2 Millstone 3 Startup Supervisor

The Millstone 3 Startup Supervisor must have eight years of applicable power plant experience with a minimum of two years of applicable nuclear power plant experience. A maximum of 4 years of nonnuclear experience may be fulfilled by satisfactory completion of academic training in engineering or the physical sciences or equivalent at the college level.

14.2.2.3.3 Millstone 3 Startup Engineer

The Millstone 3 Startup Engineer must have a bachelor’s degree in engineering or the physical sciences or the equivalent and two years of applicable power plant experience, at least one year of which should be applicable nuclear power plant experience.

14.2.2.3.4 Westinghouse Startup Manager

The W Startup Manager must meet the qualification requirements of the Millstone 3 Startup Supervisor provided in Section 14.2.2.3.2.

14.2.2.3.5 SWEC Lead Advisory Engineer

The SWEC Lead Advisory Engineer must meet the qualification requirements of the Millstone 3 Startup Supervisor provided in Section 14.2.2.3.2.

14.2.2.3.6 SWEC, W, and Consultant Startup Engineers

All SWEC, W, and Consultant Startup Engineers must possess qualifications commensurate with NNECo. personnel assigned similar tasks.

14.2.2.4 Designation of Alternates

In the absence of key members of the Startup Organization, alternate members will be designated who may act on behalf of the absent individual. In the event of extended absences, alternates will meet the designated minimum qualification requirements of the principal member.

14.2.3 TEST PROCEDURES

14.2.3.1 Discussion

Test procedures will be prepared by or under cognizance of the NNECo. staff using guidelines provided by SWEC and/or W. Phase II and subsequent test procedures are reviewed and approved by the Millstone 3 PORC. The JTG reviews and approves preoperational and subsequent startup tests.

Preoperational tests will be performed by NNECo. personnel under the direction of a startup engineer. All test procedures will be carefully adhered to with deviations permitted only through strict administrative controls. All test data will be accurately recorded and carefully evaluated.

All tests and associated documents necessary to confirm test validity will be retained for the life of the plant.

A detailed description of how these items will be accomplished is discussed in the following sections.

14.2.3.2 Test Procedure Preparation, Review, and Approval (Figure 14.2–3)

14.2.3.2.1 Preparation

As test procedures are prepared, the NNECo. startup staff may be assisted in test preparation by the SWEC advisory, W, or consultant groups.

Each test procedure will contain the following major sections:

1. Objective - A clear and concise statement of the purpose of the test

2. Acceptance Criteria - A clear identification of acceptable standards against which the success or failure of the test may be judged

3. References - Sources used to prepare the test

4. Prerequisites - Conditions and special personnel requirements, if any, which must be satisfied prior to conducting the test

5. Initial Conditions - Those conditions which must be satisfied just prior to testing. This includes a listing of requirement test equipment and environmental conditions.

6. Special Precautions - Those precautions to be observed during the procedural portion of the test

7. Procedure - Individual test steps in sequence providing appropriate methods for documenting test data

8. Restoration - Those steps necessary to restore the system to a normal or specified status

14.2.3.2.2 Review

After the test procedure is written, it is reviewed by selected members of the NNECo. staff, NUSCo. Nuclear Engineering and Operations, SWEC and/or W. Westinghouse is responsible for review of Phase II preoperational and subsequent startup tests involving W supplied systems. These reviews are coordinated by the NNECo. Startup Supervisor, and review comments are resolved by the originator of the test procedure.

14.2.3.2.3 Approval

Phase I and Generic Tests

The department head responsible for the test and the NNECo. Startup Supervisor indicate approval of the procedure by signing the cover sheet for generic and Phase I tests, respectively.

Phase II Preoperational and Subsequent Tests

The cover sheet, for Phase II preoperational and subsequent tests, must have the following before it is considered approved:

1. The signature of the NNECo. Startup Supervisor

2. The number of the JTG meeting at which the test was approved

3. The number of the PORC meeting at which the test was approved

4. The signature of the Millstone 3 Superintendent

Phase II Acceptance Tests

The same approval is required, except that the JTG need not approve the test.

14.2.3.3 Handling of Approved Tests

If, upon procedure approval, the system/component is not ready for testing, the NNECo. Startup Supervisor files the procedures. As systems/components become available for testing, the Startup Supervisor obtains the appropriate procedure(s) from the file and forwards them to a startup engineer. The startup engineer reviews the procedure and initiates any procedure changes necessary to ensure that the procedure(s) and the installed equipment are compatible and that all forms used in the procedure are current revisions. He then returns the procedure to the Startup Supervisor who initiates the release sequence.

If, upon procedure approval, the system/component is ready for testing, the Startup Supervisor initiates the release sequences.

14.2.4 CONDUCT OF THE TEST PROGRAM

14.2.4.1 Procedure Release for Performance (Figure 14.2–4)

Upon system/component turnover and procedure approval, the NNECo. Startup Supervisor coordinates the completion of procedure prerequisites and arranges for the test to be scheduled.

Phase I and Phase II testing proceeds concurrently as systems are released to NNECo. However, Phase I tests on any system will precede Phase II testing and any tests which must be completed prior to performing a subsequent test are listed as part of the prerequisites of the following test. Prior to performing the subsequent test, all deficient items on the preceding test must be corrected or an authorized exception to each item must be obtained prior to continuing. The authorized exceptions for preoperational tests and subsequent phases are approved by the JTG and documented in the JTG meeting minutes. The request must contain technical justification for its exception. For Phase I tests and Phase II Acceptance tests, the authorization for exceptions is delegated to the Startup Supervisor. The JTG will review all preoperational and subsequent tests, deficient items, and prerequisite exceptions and, if satisfied, will authorize the Startup Supervisor to release the entire test or portions of the test procedure.

Prior to performance of the test, the Shift Supervisor verifies that all appropriate plant systems are ready for the test to begin and the affected personnel have been briefed.

14.2.4.2 Performance

Each test is performed in strict conformance with the approved test procedure and any authorized changes. All test data are accurately and properly recorded on data blanks within the procedure or on specially prepared data sheets. At all times, the Shift Supervisor is responsible for the safe and proper operation of plant equipment and systems and for the safety of plant personnel. Testing will be directed by a test supervisor appointed by the cognizant department head or Startup Supervisor.

Preoperational testing is directed by NNECo. startup engineers as test supervisors supplemented by SWEC advisory engineers, W startup engineers, or qualified consultants and various NNECo. or Production Test technicians, as necessary. Certain initial startup tests are conducted under the technical direction of the NNECo. Reactor Engineer or his designated representative.

If a step in a test cannot be successfully performed because of an event such as an equipment malfunction, the test supervisor and the Shift Supervisor will determine whether the remainder of the test can be run (i.e., the failure of one instrument in an instrumentation Phase I test usually does not affect subsequent instrument tests). If the remainder can be run, the test supervisor submits a deficiency report to identify, track, and correct the problem and continues with the test. If the problem can be corrected before the test is completed, the step is performed in accordance with the procedure, and the step is signed off. If the problem cannot be corrected before the test is completed, the deficiency number is identified and the step is signed off.

There may be occasions when it is not possible to complete a test procedure due to plant conditions, partial system turnover, etc (checking a computer point, for example). If this should occur, the test will be completed to the maximum extent practicable. The exact scope of how much is done at one time is determined by the JTG for preoperational and subsequent tests and the Startup Supervisor for the other tests. When the allowed portion of the test is complete, the test is returned to the Startup Supervisor to be released when the proper prerequisites are met.

When the test is fully complete, the test supervisor reviews the test data against the stated acceptance criteria. If an item is found to be out of specification, the test supervisor will enter the step number and brief description of the deficient item. The Startup Supervisor will coordinate further evaluation.

14.2.4.3 Changes

Test changes are classified as either intent or non-intent changes. An intent change is non editorial, which changes the acceptance criteria of the test or which significantly changes the scope or the method of performance of the test. All other changes are classified non-intent.

Changes to approved test procedures receive the same approval as that required for the test being changed. For intent changes, this approval must be obtained before implementing the change, except for Phase I tests. An intent change to a Phase I test may be verbally approved by either the cognizant department supervisor or the Startup Supervisor and then implemented by the test and shift supervisors. Intent changes for Phase I tests must be approved in writing within 14 days of implementation.

Non-intent changes may be implemented by the test and Shift Supervisors with followup written approval within 14 days of implementation.

The Test and Shift Supervisors determine if a change is an intent or non-intent change. If either supervisor thinks that the change is an intent change, it will be processed as an intent change.

14.2.5 EVALUATION AND ACCEPTANCE OF TEST RESULTS (FIGURE 14.2–4)

14.2.5.1 Evaluation

All test results are evaluated by a minimum of one individual who is not a member of the department performing the test. This would normally be done by either NUSCo., NNECo., SWEC, and/or W. Additionally, qualified consultants may also be requested to evaluate the completed test results. The evaluation is to include the determination that all deficiencies have been clearly identified and are being tracked. The evaluations of all test procedures are coordinated by the NNECo. Startup Supervisor. Evaluators will use a Procedure Review Form for documenting their comments. This form becomes part of the official procedure.

14.2.5.2 Acceptance

Once the test has been thoroughly evaluated and all test deficiencies have been identified, the NNECo. Startup Supervisor will accept the test as complete. This constitutes acceptance of Phase I tests.

For preoperational and startup tests, the Startup Supervisor forwards the test to the JTG which, when satisfied that the test has been properly completed, accepts the test and returns it to the Startup Supervisor.

For Phase II acceptance tests, the JTG need not review or accept the results of the test.

The Startup Supervisor then presents the Phase II and subsequent test procedures to the Millstone 3 PORC for acceptance. PORC acceptance of the procedure is indicated in the PORC meeting minutes. Final acceptance is performed by the Millstone 3 Superintendent.

All official copies of tests, and supporting documentation required by the tests which are part of the startup test program are the property of NNECo. and will be retained for the life of the plant in accordance with the QA program described in Chapter 17.

14.2.6 TEST RECORDS

The test procedures and test data developed by the initial test program are retained and maintained in accordance with the Quality Assurance Program described in Chapter 17.

The Startup Supervisor has responsibility during the test program for controlling access to and issuing of records, receiving and sorting records, inspecting records for completeness, preparation and maintenance of the test index, and turnover of completed records to the station QA records supervisor for retention and storage as a permanent plant record.

14.2.7 CONFORMANCE OF TEST PROGRAM WITH REGULATORY GUIDES

The Millstone 3 initial test program will incorporate applicable Regulatory Guides, which, together with the extent of conformance, are discussed in the following sections.

14.2.7.1 Regulatory Guide 1.18, Revision 1 - Structural Acceptance Test for Concrete Primary Reactor Containments

For position on Regulatory Guide 1.18, see FSAR Section 1.8.

14.2.7.2 Regulatory Guide 1.20, Revision 2 - Comprehensive Vibration Assessment Program for Reactor Internals during Preoperational and Initial Startup Testing

For position on Regulatory Guide 1.20, see FSAR Section 1.8.

14.2.7.3 Regulatory Guide 1.30 - Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electrical Equipment

The Millstone 3 initial test program will comply with Regulatory Guide 1.30 test requirements.

14.2.7.4 Regulatory Guide 1.37, Revision 0 - Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants

The Millstone 3 initial test program will comply with Regulatory Guide 1.37.

14.2.7.5 Regulatory Guide 1.41, Revision 0 - Preoperational Testing of Redundant Onsite Electrical Power Systems to Verify Proper Load Group Assignments

The Millstone 3 initial test program will comply with Regulatory Guide 1.41.

14.2.7.6 Regulatory Guide 1.52, Revision 2 - Design, Testing, and Maintenance Criteria for Post Accident Engineered Safety Feature Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants

For position on Regulatory Guide 1.52, see FSAR Section 1.8.

14.2.7.7 Regulatory Guide 1.68, Revision 2 - Initial Test Programs for Water-Cooled Nuclear Power Plants

The Millstone 3 initial test program will conform to Regulatory Guide 1.68, except as specified in this section:

1. During power escalation, testing will be conducted at the 30 percent power level instead of at the 25 percent power level. Westinghouse supplied plants have generic data for the 30 percent level which they do not have at the 25 percent level (Section C.8; Appendix A, Section 5).

2. Load swing testing will be conducted at the 30, 50, 75, and 100 percent plateaus.

3. The MSIV closure test will be performed at less than 20 percent power to demonstrate the proper dynamic response of the plant and to verify proper integrated operation of plant equipment. Plant response to a full power trip will be verified by the generator trip at 100 percent power. Closure of the MSIVs at 100 percent power would not provide any additional information significant enough to warrant subjecting the plant to such a severe thermal transient (Appendix A, Section 5.m.m).

4. The loss of feedwater heaters test will not be performed. Since plant response to load swings and large load reductions is demonstrated in other tests, there is no need to subject the plant to this additional transient (Appendix A, Section 5.k.k).

5. Millstone 3 does not have a partial scram feature (Appendix A, Section 5.j).

6. Demonstration of the design capability of reactor residual or decay heat removal systems will be done during power ascension testing only if it is not done during hot functional or low power tests (Appendix A, Section 5.1).

7. The following systems will be tested during the startup test phase only if they are not completed during the preoperational test phase:

Reg. Guide Section	Component Tested
Appendix A, Section 4p	Pressurizer and main steam relief valves
Appendix A, Section 4r	Reactor coolant purification and cleanup system
Appendix A, Section 5.c.c	Gaseous and liquid waste radioactive waste systems

8. Portions of Appendix A, Section 5.s, will not be conducted. Millstone 3 does not have an integrated control system or a reactor coolant flow control system.

9. The auxiliary (startup) and emergency feedwater control systems and the steam pressure control systems will be tested before the power ascension test phase since

these systems are not used at power levels above the low power operation modes (Appendix A, Section 5.s).

10. The individual rod position indication system is the primary means for determining control rod misalignments. The design of the nuclear instrumentation is not intended to detect a misaligned control rod but rather to detect anomalous core conditions. Therefore, tests will not be conducted in accordance with Appendix A, Section 5.i. However, data on nuclear instrumentation characteristics will be obtained during the core performance test.

11. Testing on emergency loads, to demonstrate that they can start and operate with the minimum and maximum design voltage, will be performed in accordance with Branch Technical Position PSB-1 (NUREG-0800, Appendix 8A). Refer to the response to NRC Question Q430.11 for the description of testing (Regulatory Guide 1.68, Appendix A, Section 1g).

12. No-flow rod drop testing will not be performed. Since rod drop time measurements under flow are more limiting and the special test exception in the Millstone Unit 3 Technical Specifications which would allow Hot No Flow Rod Drop testing was deleted, this testing has been deemed unnecessary (Appendix A, Section 2.b).

13. The Pseudo-rod-ejection test will not be performed at greater than 10% power. Due to recommendations from the NSSS supplier which indicated both significant flux tilts resulting from this test as well as the ability to take credit for this testing performed at plants of similar design, the ejected rod test has been deemed unnecessary (Appendix A, Section 5.e).

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

The Millstone 3 initial test program will comply with Regulatory Guide 1.68.2.

14.2.7.9 Regulatory Guide 1.68.3, Revision 0 - Preoperational Testing of Instrument and Control Air Systems

The Millstone 3 initial startup test program will comply with Regulatory Guide 1.68.3 with the exceptions and clarifications as specified in this section.

1. The Millstone 3 instrument air system is nonsafety-related; all valves are designed to fail in the fail-safe position upon loss of instrument air. Safety grade cold shutdown can be achieved without the use of instrument air. A gradual loss of instrument air test shall be conducted at near normal operating conditions to verify the acceptability of emergency response procedures and system response. Valves shall be individually tested during component testing to verify that the valve responds safely, as designed, to postulated failure modes of the supply system. (Section C.8).

14.2.7.10 Regulatory Guide 1.72, Revision 1 - Spray Pond Piping Made From Fiberglass-Reinforced Thermosetting Resin For the position on Regulatory Guide 1.72, see FSAR Section 1.8.

14.2.7.11 Regulatory Guide 1.79, Revision 1 - Preoperational Testing of Emergency Core Cooling Systems for Pressurized Water Reactors

The Millstone 3 initial test program will comply with Regulatory Guide 1.79, except as specified in this section.

1. The accumulator isolation valves will be cycled at maximum differential pressure using the normal power supply only. The valve operational capability is independent of the power source (Section C.1.c.(2)).

2. The verification of containment sump vortex control will be done by means of a model test, in which all combinations of pump operation will be tested. In situ testings will be designed to verify flow paths and individual pump operations (Section C.1.b.(2)).

3. The high pressure safety injection system flow test, at hot operating conditions, will be manually initiated to provide better control in avoiding the potential for thermal shock damage. The capability of high pressure safety injection to deliver cooling water, as required, under accident conditions will be verified by analysis based on as-built HPSI pump and system head-capacity curves; however, the operability of the check valves will be demonstrated by testing. Power system response to a safety injection signal will be verified during other testing (Section C.1.a.(2)).

14.2.7.12 Regulatory Guide 1.95, Revision 1 - Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release

For the position on Regulatory Guide 1.95, see FSAR Section 1.8.

14.2.7.13 Regulatory Guide 1.108, Revision 1 - Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants

For the position on Regulatory Guide 1.108, see FSAR Section 1.8.

14.2.7.14 Regulatory Guide 1.116, Revision 0-R - Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems

For the position on Regulatory Guide 1.116, see FSAR Section 1.8.

14.2.7.15 Regulatory Guide 1.128, Revision 1 - Installation Design and Installation of Large Lead Storage Batteries for Nuclear Power Plants

The Millstone 3 initial test program will comply with Regulatory Guide 1.128.

14.2.7.16 Regulatory Guide 1.129, Revision 1 - Maintenance, Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants

The Millstone 3 initial test program will comply with Regulatory Guide 1.129.

14.2.7.17 Regulatory Guide 1.140, Revision 1 - Design, Testing, and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Absorption Units for Light-Water-Cooled Nuclear Power Plants

14.2-20 September 1986

For the position on Regulatory Guide 1.140, see FSAR Section 1.8.

14.2.8 UTILIZATION OF REACTOR OPERATING AND TESTING EXPERIENCE IN DEVELOPMENT OF TEST PROGRAM

The Millstone 3 test program will utilize information gained from operating and testing experience at similar nuclear plants to provide guidance in developing test procedures and schedules and to alert personnel to potential problem areas.

The Millstone 3 Superintendent will designate individuals on the plant staff to review pertinent industry literature, such as NRC IE bulletins, circulars and information letters, vendor information notices and applicable event reports from other facilities. Commitments resulting from this review will be tracked to ensure incorporation into plant procedures or design.

14.2.9 TRIAL USE OF OPERATING AND EMERGENCY PROCEDURES

The plant operating and emergency procedures will be incorporated into the preoperational and initial startup tests insofar as practicable. In the startup phase, deviations from the plant procedures will generally be in effect only for special test lineups or evolutions for which no plant procedure is appropriate or available under normal circumstances.

Section 13.5 covers the schedule and preparation of plant procedures in detail.

14.2.10 INITIAL FUEL LOAD AND INITIAL CRITICALITY

The following subsections provide the prerequisites, precautions, and general sequence of steps to be performed for fuel load, post-core hot functional (PCHF), and initial criticality. Upon completion of the pre-core hot functional, preparations will be made for fuel load. These preparations will include JTG evaluation of outstanding test program deficiencies. These items will be resolved prior to commencement of fuel load.

Initial fuel loading will be directly supervised by a senior licensed operator having no other concurrent duties. Following fuel load, but prior to initial criticality, the PCHF will be conducted. This precritical testing will be performed to ensure that the facility is in a final state of readiness to achieve initial criticality. After completion of PCHF, management will again make an assessment of outstanding deficiencies. When these items are resolved, the initial criticality test is performed.

14.2.10.1 Initial Fuel Load

Prerequisites necessary for loading fuel are completion of preoperational tests, establishment of applicable technical specifications, and completion of all inspections required by the NSSS Vendor. The following items are included as part of the inspections or technical specifications to be established.

1. Examination of fuel rods, poison rods, and control rods.

2. Verification of operable radiation monitors and nuclear instrumentation.

3. Check of containment equipment. This includes verification of operable fuel loading equipment. Operators who will be directly involved will get as much hands-on training as possible.

4. Reactor vessel filled with water, borated as specified, and at the correct temperature.

5. Auxiliary systems, such as the residual heat removal and emergency boron addition systems, verified to be operable.

In addition to the normal source range instrumentation, special submersible neutron detectors are used to monitor flux changes throughout the loading of the core. Data from these instruments will be used to determine, directly or through calculations (i.e., inverse count rate ratio), if an abnormal situation exists. Personnel involved in the monitoring, calculating, or evaluation of data will be briefed on their responsibilities prior to the test.

The procedure starts with the insertion of the temporary nuclear monitor detectors, and those fuel assemblies which contain neutron sources, into the vessel. This is followed by insertion of the remaining fuel assemblies in a sequence to be determined in conjunction with the NSSS Vendor. Throughout the loading sequence, the following is performed: RCS boron concentration and coolant temperature is recorded; high flux alarms are set at appropriate limits; temporary and source range detectors are monitored visually and at least one channel is monitored audibly; an inverse count rate ratio (ICCR) is calculated. A status board is used to record fuel assembly/ detector locations for each step of the procedure. At completion of core loading, a final core configuration is recorded.

Core loading operations are suspended should any of the following conditions occur.

1. An unexpected increase in count rate above a specified level.

2. An unexpected change in RCS boron concentration or water temperature.

3. An unexpected containment radiation monitoring alarm occurs.

4. An insufficient number of neutron detector channels becomes available for monitoring.

5. ICCR data indicates that an abnormal condition exists.

If core loading has been suspended for any reason, required surveillances (i.e., boron concentration, water temperature, neutron count rate, etc.) shall continue at the required frequency. Loading operations will not resume until the reason for the suspension has been understood and corrected, or has been evaluated and found acceptable.

14.2.10.2 Post-Core Hot Functional

After completion of fuel load, the technical specification shutdown margin for a fully loaded core will be verified. Steps are then taken to align and check the operability of instruments, equipment, and control systems necessary for plant heatup. Since the PCHF proceeds in steps from cold conditions to operating temperature and pressure, some prerequisites are not required until just before the appropriate condition for testing. Such prerequisites are identified within the test itself, and met before proceeding. Furthermore, several systems may be tested as appendices of the PCHF. Any prerequisites necessary for these tests will be stated in the applicable test appendix; failure to meet them affects only the test appendix, not the remaining portions of the PCHF. Plant procedures will be used to the maximum extent possible for conducting the PCHF.

Along with general precautions associated with the plant operating procedures, some important precautions for PCHF include: the requirement that reactivity changes be made under the direct supervision of a senior reactor operator, and vigilance to assure any boron dilution does not lower reactor coolant system (RCS) concentration below that required for fueling shutdown.

The PCHF initially prepares the plant for heatup. Upper core internals are installed; the reactor vessel head is placed and the studs are tensioned; cables, ductwork, and insulation are connected; and the missile shield is put in place. While at ambient temperature, the rod control system will be checked out and rod drop times are measured. After the prerequisites have been met for plant heatup (RCS filled and vented, reactor coolant pumps (RCP) operable, etc.), the RCS is heated to normal operating temperature and pressure using RCP heat. At selected points in the heatup, RCS leak tests will be performed, operation of instrumentation will be checked and compared, and plant systems will be tested in accordance with the PCHF appendices.

When normal operating temperature and pressure are reached, the following tests will be performed.

1. Pressurizer spray and heater effectiveness will be checked.

2. RCS design flow will be verified.

3. Rod drop times under hot conditions will be checked.

4. Flow coastdown will be conducted.

In addition, items encountered during the pre-core hot functional which were unsatisfactory and systems not previously checked under hot conditions will be tested. This includes a checkout of incore movable detectors, auxiliary feedwater performance verification, and steam dump controls testing.

14.2.10.3 Initial Criticality

Upon completion of the PCHF, the primary system is at hot shutdown with reactor coolant pumps operating, RCS temperature controlled using the steam bypass/dump system, and RCS boron concentration equal to or greater than the value for core loading. Remaining deficiencies are reviewed by the JTG and resolution obtained prior to authorization of performance of the initial criticality procedure. In addition to the regular plant systems necessary for initial criticality, special equipment, such as a reactivity computer and recorders for monitoring/plotting data, are checked out and verified as operational.

Prior to beginning the procedure, there should be a count rate of at least 1/2 counts per second; audible and visual count rate signals should be received from the audible count rate channel and scaler timer units, respectively, on one source range channel. Approach to criticality is done in a deliberate and orderly manner. The following precautions are observed during the procedure.

1. Criticality must be anticipated at any time reactivity is being added to the reactor core.

2. Simultaneous rod withdrawal and RCS boron dilution should not be done except as specified in the procedure.

3. Nuclear monitoring data should be observed and the ICCR calculated at specified intervals. If either the ICCR or monitored data indicates an abnormal condition as specified in the procedure, then reactivity addition should be terminated until the source of the abnormal condition is corrected or understood and considered not to adversely affect the safety of continued operations.

The initial steps of the procedure require the withdrawal of the control rods in incremental steps until the final control bank is partially withdrawn. Criticality is not expected to occur during the control rod withdrawal process, but instruments and calculated data are monitored in order to determine if any abnormal situation develops. Dilution is controlled so as to obtain a reactivity insertion rate of approximately 1 percent per hour. When the ICCR reaches about 0.1, the dilution rate is significantly reduced to achieve initial criticality in as controlled a manner as possible. Actual criticality may be achieved by withdrawing the last control bank rather than by dilution. In this case, dilution would be terminated when ICCR reaches approximately 0.3; the control group would then be withdrawn incrementally until critical. Once criticality is achieved, control banks and boron concentration are adjusted, as necessary, to maintain desired flux level in anticipation of performing low power testing.

14.2.11 TEST PROGRAM SCHEDULE

Figure 14.2–5 depicts the time frame and the general sequence of the Millstone 3 initial test program, which is conducted to insure that the plant, personnel, and procedures can safely and reliably support the initial fuel load and subsequent testing.

Figure 14.2–6 depicts the time frame and the sequence of the startup tests to take the plant from the initial fuel loading through the warranty run in a controlled manner.

The initial test program is expected to take approximately 30 months, while the startup test program is expected to take at least 5 months. Phase II preoperational and subsequent test procedures will be available for regulatory review at least 60 days prior to the scheduled performance of the test or 60 days prior to the scheduled fuel load date, whichever is sooner.

14.2.12 TEST DESCRIPTION

A summary of the sources of acceptance criteria for preoperational and startup tests is presented in Table 14.2–3.

14.2.12.1 Preoperational Tests

The test summaries for the preoperational test program, as outlined in Regulatory Guide 1.68 (Revision 2, August 1978), are provided in Table 14.2–1. The testing specified in these summaries is conducted during the Phase I, II, and III testing described in this manual. The scope and title of the summaries may not, in all cases, correspond directly to the actual test procedures which will be used. That is, certain test procedures may include more than one test as described in the summaries while in other cases the testing described in a summary may be covered under multiple procedures. The overall scope and content of testing described in the summaries will be included in final procedures.

Certain prerequisites will apply in general to all preoperational tests. These general prerequisites are listed below in lieu of inclusion in each individual summary.

1. Construction has been completed and the system has been released to NNECo, along with the necessary support systems.

2. Construction and component (Phase I) testing has been completed and any deficiencies have been properly dispositioned.

3. Permanent electrical power, air supplies, cooling water, and other support systems are available and ready for service as required.

4. Necessary test equipment is available and calibrated.

14.2.12.2 Initial Startup Tests

The initial startup test portion of the test program consists of fuel loading, precritical tests, initial criticality, low power physics, and power ascension testing. Fuel load and initial criticality procedures and tests are described in Section 14.2.10. Test summaries of all other major tests to be performed during the initial startup phase are provided in Table 14.2–2.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

(INDEX)

TEST Number	TEST NAME
1.	REACTOR COOLANT SYSTEM COLD HYDROSTATIC TEST
2.	CONTROL ROD DRIVE
3.	FUEL TRANSFER
4.	POLAR CRANE
5.	VOLUME CONTROL (CHARGING AND LETDOWN)
6.	VOLUME CONTROL (BORIC ACID)
7.	VOLUME CONTROL (BORON THERMAL REGENERATION)
8.	FUEL POOL COOLING
9.	CONTAINMENT RECIRCULATION
10.	RESIDUAL HEAT REMOVAL
11.	LOW PRESSURE SAFETY INJECTION
12.	HIGH PRESSURE SAFETY INJECTION
13.	QUENCH SPRAY
14.	REACTOR PLANT SAMPLING
15.	CONTAINMENT LOCAL LEAK RATE
16.	CONTAINMENT VENTILATION
17.	AUXILIARY BUILDING VENTILATION
18.	WASTE DISPOSAL BUILDING VENTILATION
19.	FUEL BUILDING HVAC
20.	ENGINEERED SAFETY FEATURES BUILDING HVAC
21.	CONTROL BUILDING HVAC
22.	SCREEN HOUSE HVAC
23.	EMERGENCY GENERATOR ENCLOSURE VENTILATION
24.	SUPPLEMENTARY LEAK COLLECTION AND RELEASE SYSTEM
25.	MAIN STEAM
26.	STEAM DUMP CONTROL

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
27.	STEAM GENERATOR BLOWDOWN
28.	MAIN FEEDWATER
29.	STEAM GENERATOR WATER LEVEL CONTROL
30.	AUXILIARY FEEDWATER
31.	SERVICE WATER
32.	REACTOR PLANT COMPONENT COOLING
33.	REACTOR PLANT CHILLED WATER
34.	CHARGING PUMP COOLING
35.	SAFETY INJECTION PUMP COOLING
36.	NEUTRON SHIELD TANK COOLING
37.	REACTOR PLANT GASEOUS DRAINS
38.	INSTRUMENT AIR AND CONTAINMENT INSTRUMENT AIR
39.	RADIOACTIVE LIQUID WASTE
40.	BORON RECOVERY
41.	RADIOACTIVE GASEOUS WASTE
42.	RADIOACTIVE SOLID WASTE
43.	STEAM GENERATOR CHEMICAL FEED
44.	FIRE PROTECTION - WATER
45.	FIRE PROTECTION - CO AND HALON
46.	4 KV NORMAL AND EMERGENCY DISTRIBUTION
47.	480 V NORMAL AND EMERGENCY DISTRIBUTION
48.	120 V AC INSTRUMENT NON-VITAL DISTRIBUTION
49.	120 V AC INSTRUMENT VITAL DISTRIBUTION
50.	125 V DC DISTRIBUTION
51.	DIESEL GENERATOR
52.	DIESEL GENERATOR FUEL
53.	RESERVE STATION SERVICE TRANSFORMERS

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
54.	COMMUNICATIONS
55.	NUCLEAR INSTRUMENTS
56.	INCORE NUCLEAR INSTRUMENTATION
57.	PROCESS AND AREA RADIATION MONITORING
58.	ENGINEERED SAFEGUARDS ACTUATION (DIESEL SEQUENCER)
59.	REACTOR TRIP (SOLID STATE PROTECTION SYSTEM)
60.	PROCESS PROTECTION AND CONTROL INSTRUMENT RACKS
61.	PROTECTION/SAFEGUARDS SYSTEM RESPONSE TIME TESTING
62.	DIGITAL ROD POSITION INDICATION
63.	LOOSE PARTS MONITOR
64.	SEISMIC MONITOR
65.	EMERGENCY LIGHTING
66.	ENGINEERED SAFETY FEATURES INTEGRATED TEST WITHOUT LOSS OF NORMAL POWER
67.	ENGINEERED SAFETY FEATURES TEST WITH LOSS OF NORMAL POWER
68.	LEAK DETECTION
69.	CONTAINMENT ISOLATION
70.	CONTAINMENT INTEGRATED LEAK RATE
71.	INTEGRATED PRECORE HOT FUNCTIONAL TESTING
72.	REACTOR COOLANT AND ASSOCIATED SYSTEM EXPANSION AND RESTRAINT
73.	REACTOR COOLANT AND SELECTED SYSTEMS PIPING VIBRATION
74.	THERMAL EXPANSION OF PIPING AND COMPONENTS OF SECONDARY SYSTEMS
75.	CONTROL SYSTEM TEST FOR TURBINE RUNBACK OPERATION
76.	REACTOR COOLANT LOOP ISOLATION VALVES
77.	CONDENSATE AND CONDENSATE STORAGE

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
78.	TURBINE PLANT SAMPLING
79.	TURBINE PLANT COMPONENT COOLING
80.	HEAT TRACING
81.	REFUELING WATER STORAGE TANK COOLING
82.	REACTOR VESSEL HEAD VENT
83.	CONDENSER AIR REMOVAL
84.	LEAK TEST OF SFP GATES AND TRANSFER TUBE
85.	MECHANICAL AND HYDRAULIC SNUBBERS

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

1. PREOPERATIONAL TEST - REACTOR COOLANT SYSTEM COLD HYDROSTATIC TEST

Prerequisites for testing

General prerequisites have been met. Reactor coolant pump seal water and reactor coolant pump initial operating demonstrations have been satisfactorily completed. The system, including interfacing portions of connected systems, has been filled and vented following completion of proof of cleanness, and initial water chemistry has been established. Operability of the hydro test pump has been satisfactorily demonstrated.

Test Objective and Method

The test will demonstrate the structural integrity of the reactor coolant and interfacing portions of connecting systems. The minimum temperature specified by the NSSS vendor for critical components will be established with reactor coolant pump heat prior to increasing pressure. Pressure will be increased in stages to the maximum specified pressure, monitoring for leakage at each step and performing designated inspections on system welds, joints, piping, and components. Pressure reduction to specified conditions and return of the system to a configuration for further testing will conclude the test.

Acceptance Criteria

The cold hydrostatic test satisfactorily verifies the integrity of the reactor coolant system.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

2. PREOPERATIONAL TEST - CONTROL ROD DRIVE

Prerequisites for Testing

General prerequisites have been met. The rod drive power supply M-G sets and trip breakers have been satisfactorily tested, and are operable from the control room.

Test Objective and Method

The control, logic and power cabinets are energized and verified functional. The alarm functions are checked out and the correct values of system parameters are adjusted.

Acceptance Criteria

The input failure detection circuits to the Urgent Alarm are verified operable at required setpoints. Logic cabinet operation is verified to be in the correct sequence, and Non-Urgent Alarm input circuits are verified operable. The alarm functions from each power cabinet to logic cabinet and the annunciators are verified operable. roper slave cycle selection, mechanism timing, and bank overlap are verified.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

3. PREOPERATIONAL TEST - FUEL TRANSFER

Prerequisites for Testing

General prerequisites have been met. All fuel handling equipment has been tested, checked and accepted. Construction is complete in the spent fuel pit, fuel transfer tube and refuel cavity. Dummy fuel assembly is available. Reactor vessel internals have been installed. The cask crane has been tested and is available.

Test Objective and Summary

The objective of the test will be to demonstrate the ability of the fuel handling system to move fuel from the new fuel receiving area to a selected position in the reactor core. It will also demonstrate the ability of the fuel handling system to remove selected fuel from the reactor core and move it to the spent fuel pool. During these transfers, motion of the transfer equipment will be noted, limit switch settings, stops and interlocks will be verified. The capability to move spent fuel offsite will be verified if the appropriate shipping cask is available.

Acceptance Criteria

All phases of fuel motion and interlock operation shall be in accordance with design and deemed satisfactory for safe fuel handling.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

4. PREOPERATIONAL TEST - POLAR CRANE

Prerequisites for Testing

General prerequisites have been met. All component testing including the construction 125 percent static and 100 percent dynamic load tests have been completed.

Test Objective and Summary

This test will verify operability of polar crane control circuits and ability to handle the reactor vessel head and various internals components.

Acceptance Criteria

The crane control circuits and interlocks function in accordance with design. The crane is capable of installation and removal of the reactor vessel head and those internal components placed during cold hydrostatic and hot functional testing.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

5. PREOPERATIONAL TEST - VOLUME CONTROL (CHARGING AND LETDOWN)

Prerequisites for Testing

General prerequisites have been met. The reactor coolant, reactor plant component cooling, and interfacing portions of other support systems are available. Plant is at cold ambient conditions for initial testing of components and controls and at normal operating temperature and pressure during hot functional testing for verification of thermal-hydraulic performance.

Test Objective and Summary

Testing will demonstrate the charging and letdown functions of the chemical and volume control system (CHS). The proper functioning of system components, including charging pumps, heat exchangers, valves and orifices, as well as the volume control tank level control and cover gas system, purification demineralizers, excess letdown reactor coolant pump seal water, and chemical control and makeup functions will be demonstrated. Proper operation of system controls, (including the proper operation of the auxiliary miniflow path) interlocks, and alarms will be verified.
A charging/SI test will also be performed using various combinations of weaker and stronger charging pumps injecting into the RCS cold legs via separate SI injection lines with suction taken from the RWST. The purpose of this test is to:

a. determine performance characteristics at full flow conditions,

b. verify minimum required safeguards flow is obtainable from the weaker pump,

c. verify runout flow of the stronger pump is not unacceptable, and

d. balance flow to each of the four injection lines.

Acceptance Criteria

The charging pumps meet or exceed design performance requirements. The charging and letdown normal and alternate flow paths, including heat exchangers, letdown orifices and control valves, function in accordance with design requirements. The volume control tank level system, diversion valves and cover gas system function as required. The system demineralizers operate at specified flow rates and pressure drops. The chemical control and makeup function operates in accordance with design requirements. Controls, interlocks, and alarms function properly in response to normal or simulated input signals.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

6. PREOPERATIONAL TEST - VOLUME CONTROL (BORIC ACID)

Prerequisites for Testing

General prerequisites have been meet. The reactor coolant system and interfacing portions of the volume control and supporting systems are available.

Test Objective and Summary

Testing will demonstrate the operability of the boric acid subsystem of the chemical and volume control system (CHS). The ability of the system to mix, store and deliver boric acid in required concentrations will be verified. Testing may be performed in conjunction with other CHS subsystem testing.

Acceptance Criteria

Boric acid can be mixed, stored and delivered in accordance with specified design parameters.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

7. PREOPERATIONAL TEST - VOLUME CONTROL (BORON THERMAL REGENERATION)

Prerequisites for Testing

General prerequisites have been met. The reactor coolant system, reactor plant component cooling and interfacing portions of the volume control and supporting systems are available. The plant is at cold ambient conditions for initial testing of components and controls and at normal operating temperature and pressure for verification of system performance during hot functional testing or later as plant conditions permit.

Test Objective and Summary

Testing will demonstrate the operability of the boron thermal regeneration subsystem of the chemical and volume control system (CHS). Operability of system controls and interlocks will be demonstrated. The capability of the thermal regeneration demineralizers to operate in the borate and dilute modes will be verified.

Acceptance Criteria

The boron thermal regeneration system performs in accordance with design specifications. Effluent boron concentrations are in accordance with design requirements in the borate and dilute modes of operation. Controls, interlocks and alarms operate in accordance with design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

8. PREOPERATIONAL TEST - FUEL POOL COOLING

Prerequisites for Testing

General prerequisites have been met. Transfer canal and spent fuel storage pool are complete and available, with initial fill and leak test completed.

Test Objective and Summary

Test objective will be to demonstrate the capability of the system to function in all design flow paths as required for safe storage of fuel. Testing will include the verification that fuel storage areas can be flooded and drained as required; that circulation thru heat exchangers is established; that alarms actuate and instrumentation functions. Skimmer operation of the fuel storage areas will be demonstrated. Skimmer operation in the Refueling Cavity as well as system recirculation and purification (including the RWST) will be demonstrated prior to refueling.

Acceptance Criteria

The flow rates of system pumps will be verified to be in accordance with design. Flow paths are correct for system cooling, skimming and purification functions and between the system and the refueling water storage tank. The purification system will maintain acceptable water quality. System level and temperature alarms function as designed for safe storage of fuel.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

9. PREOPERATIONAL TEST - CONTAINMENT RECIRCULATION

Prerequisites for Testing

General prerequisites have been met. The containment sump special test structure has been erected and provisions for fill and recirculation to the RWST have been completed.

Test Objective and Summary

Testing will demonstrate the capability of the containment recirculation system to take a suction on the containment sump and discharge to either the recirculation spray headers or the low pressure safety injection system. The test will be conducted utilizing a temporary test structure (cofferdam) to permit filling above the level of the containment floor. Spray nozzles will be blocked and a flow path will be established to recirculate water back to the RWST. Pumps will be operated singly to determine individual performance characteristics and to verify flow paths. Adequate NPSH for the design accident operation of the system will be verified.

The foregoing test will be supplemented by a model test which will verify acceptable vortex control.

Following the flow test, nozzles will be installed and verified operable utilizing air. The flow path for the air test shall overlap that of the water test to also verify that there is no blockage in any section of the flow path.

System controls, interlocks and alarms will be demonstrated operable in accordance with design.

Acceptance Criteria

The containment recirculation system meets design performance requirements established by the safety analysis. Unobstructed flow paths are verified for spray nozzles and ring headers. Controls, interlocks, and alarms function in accordance with design for normal and simulated accident signals.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

10. PREOPERATIONAL TEST - RESIDUAL HEAT REMOVAL

Prerequisites for Testing

General prerequisites have been met. The reactor coolant and reactor plant component cooling water are available. The refueling water storage tank is available and filled with demineralized or borated water.

Test Objective and Summary

Testing will demonstrate the capability of the RHR system to operate in both the cooldown and safety injection modes. Initial system operation will be demonstrated with the plant at cold ambient conditions, with the following specific tests:

1. Verification of RHR inlet valve interlocks and controls
2. Demonstration of acceptable pump performance on miniflow
3. Verification of proper miniflow control valve operation
4. Demonstration of startup recirculation operation

Testing will continue through plant heatup for hot functional testing and upon cooldown following hot functional testing at which time system thermal hydraulic performance and ability to cool the RCS will be verified to be in accordance with the design.
The system ability to deliver water to the RCS in the safety injection mode will be demonstrated. This testing will be performed during the demonstration of low pressure safety injection operation during ESF functional testing.
The system will be operated in the refueling mode to demonstrate its ability to transfer water from the RWST to the refueling cavity and provide a cooling flow path during refueling operations.

Acceptable Criteria

The RHR system meets or exceeds design requirements for reaching and maintaining cold shutdown conditions, operating in the safety injection mode and providing cooling during refueling operations.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

11. PREOPERATIONAL TEST - LOW PRESSURE SAFETY INJECTION

Prerequisites for Testing

General prerequisites have been met. The reactor vessel is open with internals removed for the full flow portion of the test and closed with plant at necessary temperature and pressure for demonstrations of check valve hot operability. Nitrogen or compressed air is available for accumulator pressurization. A supply of demineralized water or borated water is available.

Test Objective and Summary

Testing will demonstrate system ability to perform its intended safety function. Specific tests will include the following.

1. Discharge of each accumulator to the cold reactor coolant system. Level and pressure measurements will be used to evaluate accumulator discharge performance and to verify that the pipe resistance is within an acceptable range.

2. Verification of nitrogen fill, vent and relief and accumulator makeup and drain capability.

3. Verification of the ability of accumulator isolation valves to open automatically on a safety injection signal against maximum expected differential pressure conditions.

4. Verification of accumulator discharge check valve operability with the RCS in a hot condition.

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

Acceptance Criteria

The low pressure safety injection system performance meets design requirements of the safety analysis.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

12. PREOPERATIONAL TEST - HIGH PRESSURE SAFETY INJECTION

Prerequisites for Testing

General prerequisites have been met. The refuel water storage tank has been filled to the proper level for testing with water of the required chemistry. For cold testing the reactor vessel will be open with upper and lower internals removed.
Hot testing will be performed with the reactor vessel closed, during hot functional testing.

Test Objective and Summary

Tests will be conducted to provide assurance that the high pressure safety injection will accomplish its intended safety function. The total system test will be instituted by a safety injection signal. It will be demonstrated that proper flow thru each injection path is developed while various suction flow paths are utilized. The preoperational test will use both high pressure safety injection (HPSI) pumps. The test flow injection paths will include both the reactor coolant system (RCS) cold legs and hot legs. Pump capacity and proper NPSH will be verified under different flow path conditions. Testing will verify that pumps will not trip out under maximum attainable flow conditions and that adequate margin exists between trip points and maximum pump operating conditions for pump motor trips. Response time of the pumps (time of start signal until desired flow conditions are met) will be evaluated. Proper functioning of alarms, instruments, and valves will be verified as well as valve speed of response. Valve speed and positioning will be verified in the control room and by local visual observation. The capability of HPSI to deliver as required under accident conditions will be verified by analysis based on as built HPSI pump and system head-capacity curves.
With the reactor coolant system at normal operating temperature and pressure during hot functional testing, a hot flow test will be performed by injecting a small amount of water into the RCS to verify the operability of the system check valves.
Under both test states, vibration and general movement of piping supports will be measured and evaluated.

Acceptance Criteria

All test performance will be evaluated against design requirements. Tests will be acceptable if design requirements of the safety analysis are satisfied.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

13. PREREQUISITES TEST - QUENCH SPRAY

Prerequisites for testing

General prerequisites have been met. Air supply available for nozzle testing.

Test Objective and Summary

Testing will demonstrate the hydraulic performance of the quench spray system, proper functioning of spray nozzles and proper operation of the refuel water storage tank.
The refuel water storage tank chemical addition and recirculation system will be demonstrated operable in accordance with design requirements. Quench spray pumps will be operated through the recirculation test lines with spray headers isolated to demonstrate hydraulic performance.
Proper operation of system controls, interlocks, and alarms will be demonstrated for normal and accident signals. Heat tracing circuitry serving the system will be demonstrated operable in accordance with design.
Spray nozzles will be tested for proper performance using air.
The flow path for the air test shall overlap that of the water test to also verify that there is no blockage in any section of the flow path.

Acceptance Criteria

The quench spray system performance meets design performance requirements established by the safety analysis. Unobstructed flow paths are verified for spray nozzles and ring headers. Controls, interlocks, and alarms function in accordance with design for normal and simulated accident signals.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

14. PREOPERATIONAL TEST - REACTOR PLANT SAMPLING

Prerequisites for Testing

General prerequisites have been met. Installation of all sample lines and instrumentation from the remote sample points to local stations are complete and ready for service.

Test Objective and Summary

Test objective will be to demonstrate that samples can be taken from reactor plant systems during cold and hot functional testing. Testing will be performed to insure that proper sample flow rates can be regulated, isolation valves respond to isolation signals and that cooling water flow to sample heat exchangers is adequate.

Acceptance Criteria

Sample system must demonstrate the capability to operate within design pressure, temperature and flow conditions, manufacturer's recommendations and needs of plant operation.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

15. PREOPERATIONAL TEST - CONTAINMENT LOCAL LEAK RATE

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

Testing will examine containment penetrations, including air locks and containment isolation valves for leakage in accordance with 10 CFR Part 50, Appendix J. The leak rate across each containment boundary will be measured.

Acceptance Criteria

Containment local leak rate tests meet the requirements imposed by 10 CFR Part 50, Appendix J, Type B and Type C tests.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

16. PREOPERATIONAL TEST - CONTAINMENT VENTILATION

Prerequisites for Testing

General prerequisites have been met. Plant may be at ambient temperature or at hot functional conditions as required by individual test procedures.

Test Objective and Summary

Six subsystems make up the containment ventilation system and are designated as the hydrogen recombiner system, containment air recirculation system, control rod drive mechanism cooling system, containment air filtration system, containment purge system, and the containment vacuum system. Each subsystem will be tested for performance as part of the containment ventilation system.

The hydrogen recombiner system will verify proper blower capacity and heat rise through the electric heaters using the containment atmosphere.

Operation of the three fans of the containment air recirculation system will be verified with air flow balancing performed during operation. Control of cooling water to the containment coolers, temperature sensor operation as well as damper operation will be verified.

The control rod drive mechanism shroud ventilation units will be verified capable of maintaining temperatures in the CRDM shroud within design limits.

The containment air filtration system will be tested to demonstrate fan performance and to verify filter efficiency.

Fan, heater and damper operation will be verified during testing of the containment purge system.

Both vacuum pumps of the containment vacuum system as well as the air ejector will be tested for ability to reach and maintain design containment vacuum conditions.

Acceptance Criteria

All subsystems of the containment ventilation system meet the requirements of specification and design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

17. PREOPERATIONAL TEST - AUXILIARY BUILDING VENTILATION

Prerequisites for Testing

General prerequisites have been met. Filter systems have been installed and charged and support systems such as instrument air and electrical are available.

Test Objective and Summary

Test objective will be to demonstrate that the auxiliary building ventilation system is capable of providing a suitable environment for personnel and equipment and capable of preventing the spread or release of airborne radioactive material to the atmosphere.
Air flows into and out of the auxiliary building in accordance with design and ability to maintain a subatmospheric pressure in the building will be verified. Manual and automatic operation of fans will be verified.
Proper operation of inlet and exhaust isolation dampers will be verified in manual and automatic modes.
Instrumentation interlocks and alarm operation will be verified. Filter systems will be tested for efficiency, flow rates, leak tightness and overall operation. Heaters will be energized and resulting temperatures recorded.

Acceptance Criteria

Ventilation system balance in accordance with design criteria and a subatmospheric pressure will be verified. Fan and damper operation for various modes of operation will be verified as correct in accordance with design requirements. Filters will meet efficiency, flow and leak tightness as specified in design requirements.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

18. PREOPERATIONAL TEST - WASTE DISPOSAL BUILDING VENTILATION

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

It will be demonstrated that the waste disposal building ventilation system will provide a suitable environment for personnel and equipment. Air flows will be verified to insure that in potentially contaminated areas the pressure will be subatmospheric. Heating elements will be actuated and power operated dampers will be actuated.

Acceptance Criteria

Air flows will be verified to be in accordance with design requirements. Dampers will attain proper position during power operation.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

19. PREOPERATIONAL TEST - FUEL BUILDING HVAC

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

Testing will be performed to demonstrate that the ventilation system will maintain a suitable environment for personnel and equipment. A subatmospheric condition in the fuel building will be verified. Operation of the exhaust dampers, heating coils and temperature controls will also be verified. Testing of the exhaust filter train will be performed.

Acceptance Criteria

Functional and performance testing will verify design requirements and criteria.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

20. PREOPERATIONAL TEST - ENGINEERED SAFETY FEATURES BUILDING HVAC

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

Testing will be used to verify proper system logic during normal and emergency operation. Testing will be used to demonstrate the capability of the five ESF building ventilation subsystems to provide design air flows. The design air exchange capability will be verified in the auxiliary feedwater pump and ventilation mechanical room area. Cooling capacity to the areas of the containment recirculating pumps, quench spray pumps, residual heat removal pumps and safety injection pumps will be determined by operation of the cooling equipment with known heat loads and extrapolating the resulting data to verify that the systems can remove the postulated post-accident heat load.

Acceptance Criteria

Performance of each ventilation subsystem will be in accordance with the design requirements for operation and will be proven capable of maintaining area temperature during post-accident heat load conditions.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

21. PREOPERATIONAL TEST - CONTROL BUILDING VENTILATION

Prerequisites for Testing

General prerequisites have been met. Ductwork has been cleaned and filters have been installed.

Test Objective and Summary

The ability of the ventilation system to maintain personnel comfort and provide proper air conditions for equipment operation will be demonstrated. The capability to isolate the control building from the outside atmosphere will be demonstrated utilizing simulated signals of SIS and atmospheric high radiation or chlorine.

Entering and exhaust air flows will be determined and the ability to keep the control room above atmospheric pressure will be verified. The control room emergency ventilation system will be tested and will include testing of the compressed air storage system. The control room envelope leak rates will be demonstrated to be within specified design values.

Flow through the filter assemblies will be measured and analyzed, heating elements will be energized and chill water flows evaluated.

Manual and automatic operation of fans and dampers will be verified as well as instrument interlocks and alarm operation.

Acceptance Criteria

Control room leak rate is in accordance with predetermined design values. Air flows, damper operation, cooling, humidity, and heating performance will be in accordance with design requirements. Filters will meet the design requirements of flow, leak tightness and efficiency.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

22. PREOPERATIONAL TEST - SCREEN HOUSE HVAC

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

Both circulating water and service water ventilation systems will be tested to insure an environment suitable for personnel and equipment. Air flows will be recorded. Fan, damper and heater operation will be verified.

Acceptance Criteria

Air flows, damper operation, heaters, and thermostatic controls will perform in accordance with design requirements.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

23. PREOPERATIONAL TEST - EMERGENCY GENERATOR ENCLOSURE VENTILATION

Prerequisites for Testing

General prerequisites have been met. The diesel generator is available for full-load testing during system performance testing.

Test Objective and Summary

Emergency generator enclosure building ventilation system testing will verify that ambient enclosure temperatures are in accordance with the general design temperature requirements during generator operation, under loaded conditions. Proper operation of thermostatically controlled dampers and fans as well as enclosure cubicle heaters, inlet and outlet dampers and auto start of the ventilation equipment along with the diesels will be demonstrated.

Acceptance Criteria

Operation and performance of the system will be in accordance with design requirements.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

24. PREOPERATIONAL TEST - SUPPLEMENTARY LEAK COLLECTION AND RELEASE SYSTEM (SLCRS)

Prerequisites for Testing

General prerequisites have been met. Filter banks have been installed, charged and ready for test.

Test Objective and Summary

Testing will demonstrate the operation of equipment which will be used to minimize the release of airborne radioactive contaminants and to create a partial vacuum in the enclosure, main steam valve, engineered safety features, hydrogen recombiner and auxiliary buildings.
Each filter bank will be tested for efficiency, absorption, contact time and flow. Fan performance and the variable fan inlet vanes which work in conjunction with pressure controls in the enclosure building will be demonstrated operable in accordance with design requirements. Automatic start of each system, utilizing simulated signals, will be verified. Bypass leak testing of each filter will be performed.

Acceptance Criteria

Acceptance of the system will be based upon component test and integrated system tests meeting the design requirements for the supplementary leak collection and release system.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

25. PREOPERATIONAL TEST - MAIN STEAM

Prerequisites for Testing

General prerequisites have been met. The system is at ambient temperature and pressure for verification of control and interlock functioning and at normal temperature and pressure during hot functional testing for functional performance verification.

Test Objective and Summary

Testing will verify the operation of main steam system protection and control functions. Portions of the test will be coordinated with the steam dump control system testing. Specific tests will:

1. demonstrate proper operation of main steam isolation valves (MSIV) and bypass valves;

2. demonstrate the response of the MSIV and bypass valves to a steamline isolation signal (SLI), including verification of closure time;

3. demonstrate the proper operation of atmospheric relief valves and condenser steam dump valves in conjunction with testing of the steam dump control system;

4. demonstrate proper operation of the atmospheric relief blocking valves;

5. demonstrate the operation of the steam generator safety valves, verifying setpoints with a pressure-assist device and verifying proper reseating and leakage within specified limits; and

6. demonstrate the operation of the turbine driven auxiliary feedwater pump stop valves and speed controls.

Acceptance Criteria

The main steam isolation valves and bypass valves respond within specified time limits to local and remote signals and upon receipt of a steamline isolation signal. Steam generator safety valves operate in accordance with design requirements and reseat properly with seat leakage at normal operating pressure within design limits. Main steam atmospheric relief valves and blocking valves operate in accordance with design requirements. The turbine driven auxiliary feedwater pump steam stop valves operate and pump speed can be controlled within specified design limits.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

26. PREOPERATIONAL TEST - STEAM DUMP CONTROL

Prerequisites for Testing

General prerequisites have been met for the main steam and process protection systems. The steam dump control system has been aligned and calibrated to initial settings. The steam generator atmospheric relief, safety and condenser steam dumps have been checked and are operational.

Test Objective and Summary

Testing will be performed prior to and during the pre-core hot functional tests to verify that the steam dump control system operates properly in the manual and automatic modes. Testing will demonstrate that system interlock functions operate as designed on receipt of blocking signals. Testing will also verify that the atmospheric relief and condenser steam dump valves open in the time required to preclude steam generator safety valve operation during a plant trip which utilizes steam dump. During hot functional testing only one steam dump or atmospheric relief will be operated at a time.

Acceptance Criteria

The atmospheric relief valves operate in accordance with design in both manual and automatic modes. The condenser steam dump valves operate in accordance with design from the steam header pressure controller, load rejection controller and turbine trip controller. Blocking interlocks function to prevent condenser steam dump valve opening. The condenser steam dump opening time is equal to or less than a predetermined interval.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

27. PREOPERATIONAL TEST - STEAM GENERATOR BLOWDOWN

Prerequisites for Testing

General prerequisites have been met. The system is at ambient temperature and pressure for verification of control and interlock functions, and at normal operating temperature and pressure during hot functional testing for functional performance verification.

Test Objective and Summary

Testing will verify that the blowdown isolation valves will respond to design isolation signals, and that system controls and interlocks function per design.

Acceptance Criteria

Blowdown isolation valves shut on receipt of the auxiliary feed pump running signal within specified time limits. The blowdown flow control system operates in accordance with design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

28. PREOPERATIONAL TEST - MAIN FEEDWATER

Prerequisites for Testing

General prerequisites have been met for both the feedwater and condensate systems. Testing will take place both prior to and during hot functional tests, and during power ascension.

Test Objective and Summary

The test objective will be to demonstrate and verify that the engineered safety features of the system perform in a predetermined manner. Feedwater flow will be interrupted to all steam generators upon receipt of a feedwater isolation signal. Verification of valve operability and time of closure will be made. A trip signal will be given to the feed pumps in response to a simulated safety injection signal or a steam generator High-High level signal. A valve trip signal will be generated during power ascension by a Low TAV signal.

Acceptance Criteria

Operation of the pumps, valves support systems, and signals perform in a manner satisfactory to meet engineered safety feature design criteria.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

29. PREOPERATIONAL TEST - STEAM GENERATOR WATER LEVEL CONTROL

Prerequisites for Testing

General prerequisites have been met for the feedwater system, and process protection and control systems.

Test Objective and Summary

Testing will verify that system control functions are in accordance with design using simulated inputs for steam generator water level, feed flow and steam flow. The operation of both the main and bypass feedwater regulating valves, system interlocks and controls will be checked. The response of the feedwater regulating valves to feedwater isolation signals will be checked. Completion of testing is prerequisite to initial startup power ascension testing during which final system adjustments are made.

Acceptance Criteria

Response of the feedwater regulating and feedwater bypass valves is in accordance with initial design calculations for specified combinations of 3-element control input. The feedwater regulating and bypass valves respond properly and within specified time constraints to feedwater isolation signals.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

30. PREOPERATIONAL TEST - AUXILIARY FEEDWATER

Prerequisites for testing

General prerequisites have been met. Demineralized water storage tank is filled to the specified level and plant conditions have been established for the particular phase of the test to be performed.

Test Objective and Summary

The test will verify at ambient plant conditions that the system components and controls will function as designed, including flow path verification and capability of auto start, flow control and flow limiting controls and interlocks. The initial operation of the turbine driven auxiliary feedwater pump and ability to deliver design flow to each steam generator will be verified during hot functional testing. Proper operation of the turbine auxiliary oil system will be verified. Proper operation of heat tracing circuits will be verified. All auxiliary feedwater pumps will have an endurance test at least 48 hours long. Following this endurance run, the pumps will be shut down, cooled down, and then be restarted and run for at least one hour.

Acceptance Criteria

The minimum flow capacity at design head of each auxiliary feedwater pump and steam generator feed rate as specified in the safety analysis will be verified. The system will respond to auto start signals and will act to limit flow to a faulted steam generator. Proper lubrication is observed in the auxiliary turbine. System operation, startup and shutdown does not result in flow instabilities or water hammer.

Auxiliary feedwater pumps will remain within design limits, normal and backup water supply flow paths will be verified, and pump room ambient conditions do not exceed environmental qualification limits for safety related equipment in the room.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

31. PREOPERATIONAL TEST - SERVICE WATER SYSTEM

Prerequisites for Testing

General prerequisites have been met. Intake structure service water bays are flooded and open for water flow. Yard vacuum priming system is in operation. Tests will take place prior to and during hot functional testing.

Test Objective and Summary

The test objectives will be to insure proper flow to various system heat exchangers to maintain the desired cooling effects. Testing will include verification of flows to each component, safety actuation of pumps and valves, temperature differences recorded. System operation will be demonstrated in both normal and emergency modes.

Acceptance Criteria

The service water system will be verified to function in accordance with the specified design requirements of both safety and normal operating modes.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

32. PREOPERATIONAL TEST - REACTOR PLANT COMPONENT COOLING

Prerequisites for Testing

General prerequisites have been met. Service water system is operational. Plant is at cold ambient conditions for verification of control and interlock operation, and at normal operating temperature for verification of thermal-hydraulic performance during hot functional testing.

Test Objective and Summary

Testing will demonstrate the capability of the reactor plant component cooling system to supply adequate cooling to its components. Specific testing will:

1. demonstrate system component operability, control, alarm, and interlock functions;

2. verify that components served by the system receive adequate cooling under normal and emergency operating conditions and that thermal and hydraulic parameters are in accordance with design; and

3. achieve flow balancing to the maximum extent practicable prior to power operation. Adjustments required by added heat loads will be made in the startup test phase.

Acceptance Criteria

The system thermal-hydraulic performance meets design requirements. Control, alarm and interlock functions perform in accordance with design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

33. 33.PREOPERATIONAL TEST - REACTOR PLANT CHILLED WATER

Prerequisites for Testing

General prerequisites have been met. The reactor plant component cooling water system is available. Plant is at cold ambient conditions for verification of control and interlock operation and at normal operating temperature for verification of thermal-hydraulic performance during hot functional testing.

Test Objective and Summary

Testing will demonstrate the capability of the reactor plant chilled water system to supply adequate cooling to its components. Specific testing will:

1. demonstrate system component operability, control alarm, and interlock functions;

2. verify that components served by the system receive adequate cooling under normal operating conditions and that thermal and hydraulic parameters are in accordance with design; and

3. achieve flow balancing to the maximum extent practicable prior to power operation. Adjustments required by added heat loads will be made in the startup test phase.

Acceptance Criteria

The system meets design cooling requirements. Control, alarm, and interlock functions perform in accordance with design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

34. PREOPERATIONAL TEST - CHARGING PUMP COOLING

Prerequisites for Testing

General prerequisites have been met. Reactor plant component cooling service water and CHS systems are available. Plant is at cold ambient conditions for verification of control and interlock operation and at normal operating temperature for verification of system cooling performance.

Test Objective and Summary

Testing will demonstrate the capability of the charging pump cooling system to supply adequate cooling. System component operability, control, alarm, and interlock functions will be demonstrated. Adequate cooling will be verified after balancing of flow under normal operating conditions.

Acceptance Criteria

The system meets design cooling requirements. Control, alarm, and interlock functions perform in accordance with design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

35. PREOPERATIONAL TEST - SAFETY INJECTION PUMP COOLING

Prerequisites for Testing

General prerequisites have been met. Reactor plant component cooling, service water, and safety injection systems are available.

Test Objective and Summary

Testing will demonstrate the capability of the safety injection pump cooling system to supply adequate cooling. System component operability, control, alarm, and interlock functions will be verified after balancing of flow under normal operating conditions.

Acceptance Criteria

The system meets design cooling requirements. Control, alarm, and interlock functions perform in accordance with design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

36. PREOPERATIONAL TEST - NEUTRON SHIELD TANK COOLING

Prerequisites for Testing

General prerequisites have been met. Reactor plant chilled water is available. Plant is at normal operating temperature for verification of system performance during hot functional testing.

Test Objective and Summary

Testing will verify the capability of the system to maintain design temperature within the neutron shield tank.

Acceptance Criteria

The neutron shield tank temperature can be maintained within specified design limits. System alarms function in accordance with design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

37. PREOPERATIONAL TEST - REACTOR PLANT GASEOUS DRAINS

Prerequisites for Testing

General prerequisites have been met. The boron recovery and radioactive gaseous waste systems are capable of receiving drains.

Test Objective and Summary

Testing will demonstrate the capability of the system to transfer drainage from the pressurizer relief tank, containment drains transfer tank, and primary drains transfer tank to the boron recovery and/or radioactive gaseous waste systems. Flow paths from systems draining to the system tanks will be verified operable. Control interlock and alarm functions will be verified operable in accordance with design.

Acceptance Criteria

The system will accept and transfer reactor plant gaseous drains. System parameters, controls interlocks, and alarms function in accordance with design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

38. PREOPERATIONAL TEST - INSTRUMENT AIR AND CONTAINMENT INSTRUMENT AIR

Prerequisites for Testing

General prerequisites have been met. The system has been pressure tested using instrument air quality gas.

Test Objective and Summary

Testing will be performed to provide assurance that the instrument air system will provide clean dry air at the proper pressure to end use equipment.
All air operated valves are individually tested to ensure proper operation. This testing includes proper response to loss of air.
Compressors will be tested for manual and automatic starting, quality and volume of air delivered and verification of instrument readings. Cooling water flows to the compressors will be verified. Instrument air dryers will be coupled to the compressor and full flow air tests will be conducted. Dryers will be operated full cycle with automatic switching of dryer towers verified. Instruments and alarm settings will be verified. Total air demand at normal steady state conditions, including leakage from the system, will be verified to be in accordance with design. Quality of air will be evaluated at the dryer outlet. Further verification of cleanliness shall be verified by blowdown of instrument air lines through a filter cloth. A gradual loss of instrument air test shall be conducted at near normal operating conditions to verify acceptability of emergency response procedures and system response. A test shall be conducted to demonstrate that plant equipment designed to be supplied by the instrument air system is not supplied by other air supplies having less restrictive air quality requirements. Plant components requiring large quantities of instrument air shall be operated simultaneously while the system is at near normal steady state conditions to verify that pressure transients in the distribution system do not exceed acceptable values. Functional testing shall be performed to verify that failures resulting in an increase in the supply system pressure will not cause peak transient pressures above the design pressure of the system components.

Acceptance Criteria

All equipment in the instrument air system will perform in an acceptable manner in accordance with design requirements.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

39. PREOPERATIONAL TEST - RADIOACTIVE LIQUID WASTE

Prerequisites for Testing

General prerequisites have been met. The reactor plant aerated drain system is available.

Test Objective and Summary

Testing will demonstrate the capability of the reactor plant aerated drain system to transfer drainage to the radioactive liquid waste system, and the capability of the waste system and the condensate demineralizer liquid waste system to process, store and control the release of radioactive liquid wastes. Control, interlock, and alarm functions will be verified to operate in accordance with design.

Acceptance Criteria

The radioactive liquid waste and reactor plant aerated drain systems function in accordance with design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

40. PREOPERATIONAL TEST - BORON RECOVERY

Prerequisites for Testing

General prerequisites have been met. The radioactive gaseous waste and reactor plant gaseous drain systems are available.

Test Objective and Summary

Testing will demonstrate the capability of the system to process, store and control the transfer of letdown coolant, distillate boric acid, and discharge waste. Control, interlock, and alarm functions will be verified to operate in accordance with design.

Acceptance Criteria

Process rates, storage capacities, and discharge concentrations fulfill the design requirements of the system. Control, interlock, and alarm functions operate in accordance with design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

41. PREOPERATIONAL TEST - RADIOACTIVE GASEOUS WASTE

Prerequisites for Testing

General prerequisites have been met. The reactor plant aerated and gaseous vent systems are available.

Test Objective and Summary

Testing will demonstrate the capability of the system to process, store, and control the release of radioactive gaseous waste. Controls, interlocks, and alarms will be verified functional in accordance with design.

Acceptance Criteria

The system functions in accordance with design to process and control the release of radioactive gaseous waste.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

42. PREOPERATIONAL TEST - RADIOACTIVE SOLID WASTE

Prerequisites for Testing

General prerequisites have been met. Representative samples of process waste and resin as well as process chemicals are available to support demonstration of operation.

Test Objective and Summary

Testing will demonstrate the capability of the system to process waste from the various influent streams to a form acceptable for disposal. Control, interlocks, and alarms will be verified functional in accordance with design.

Acceptance Criteria

The waste solidification process is demonstrated acceptable in conformance with design requirements.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

43. PREOPERATIONAL TEST - STEAM GENERATOR CHEMICAL FEED

Prerequisites for Testing

Standard prerequisites have been met. Plant is at cold shutdown for system design chemical feed rate verification. Plant is at normal operating temperature and pressure for containment isolation verification.

Test Objective and Summary

Testing will verify that the system will deliver steam generator chemicals at design rates and demonstrate the containment isolation function.

Acceptance Criteria

Design chemical feed rates are achieved. Containment isolation occurs upon receipt of signal within design time limits.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

44. PREOPERATIONAL TESTS - FIRE PROTECTION - WATER

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

Test objective will be to demonstrate system response to various fire alarms and sensor inputs. Instrument setpoints will be checked, system pressures will be verified and valves separating seismic portions of the system from the remainder of the system will be actuated.

Acceptance Criteria

Desired system response to alarms and sensor inputs will be required. Satisfactory operation of boundary valves and system pressures necessary for flow requirements will be demonstrated.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

45. PREOPERATIONAL TEST - FIRE PROTECTION - CO AND HALON

Prerequisites for testing

General prerequisites have been met. All systems have been flushed and cleaned. Storage facilities for gas are complete and control and instrumentation have been checked and calibrated. Electric power is available for alarms, heaters, and refrigeration service. Storage tank safety valves and vents have been checked for settings and proper installation.

Test Objective and Summary

Testing will demonstrate the capability of the system to respond to various fire alarms. Gas flows to protected Category I enclosures will be verified with systems responding to automatic and manual actuation. Alarms, timers, and instrumentation associated with the fire protection system will be tested.

Acceptance Criteria

Gas concentrations in protected areas will be evaluated for acceptable fire fighting capabilities. All alarms, timers, and instrumentation will perform in a predetermined manner.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

46. PREOPERATIONAL TEST - 4 KV NORMAL AND EMERGENCY DISTRIBUTION

Prerequisites for Testing

General prerequisites have been met. All circuits have been terminated and released to the operating staff. Initial component and pre-energization testing is complete.

Test Objective and Summary

Testing will verify ability to energize each bus from the reserve station service transformer and bus ties. Overcurrent and differential protective schemes, breaker interlocking schemes, manual transfer and response to lockout signals will be tested. The ability of each bus to carry its maximum expected load will be verified as much as is practicable during hot functional testing or at such time that the maximum expected load is available.

Acceptance Criteria

Upon energization each bus will be verified for proper voltage and phase rotation. Proper operation, phase relationships and current magnitudes on the secondary of protective devices are verified.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

47. ACCEPTANCE/PREOPERATIONAL TEST - 480 V NORMAL AND EMERGENCY DISTRIBUTION

Prerequisites for Testing

General prerequisites have been met. All circuits have been terminated and released to the operating staff. Initial component and pre-energization testing is complete.

Test Objective and Summary

Testing will verify ability to energize each load center and motor control center (MCC) from its associated power supply. The interlocking functions of circuit breakers will be verified to operate correctly. The ability of each bus to carry its maximum expected load will be verified during hot functional testing or at such time that the maximum expected load is available.

Acceptance Criteria

Upon energization, bus and MCC voltage will be verified within design limits. Phase rotation will be verified correct. The sequence of breaker interlocking will be verified to be in accordance with design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

48. PREOPERATIONAL TEST - 120 V AC INSTRUMENT NON-VITAL DISTRIBUTION

Prerequisites for Testing

General prerequisites have been met. All circuits have been terminated and released to the operating staff. Initial component and pre-energization testing is complete.

Test Objective and Summary

Testing will verify ability to energize the 120 V AC nonvital instrument distribution panel and computer power supply from their respective power sources. The ability of the non-vital inverters to carry the maximum expected load, and the capability of the static switches to transfer loads between normal and alternate sources will be verified.

Acceptance Criteria

Voltage on the instrument bus will be verified within design limits for the various combinations of power sources and loads. The capability of inverter static switches to transfer without load interruption within the design time delay limits will be verified.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

49. PREOPERATIONAL TEST - 120 V AC INSTRUMENT VITAL DISTRIBUTION

Prerequisites for Testing

General prerequisites have been met. All circuits have been terminated and released to the operating staff. Initial component and pre-energization testing is complete.

Test Objective and Summary

Testing will verify ability to energize the 120 V AC vital instrument distribution panels from their respective power sources. The ability of the vital inverters to carry the maximum expected load, and the capability of the static switches to transfer loads between normal and alternate sources will be verified.

Acceptance Criteria

Voltage on the instrument buses will be verified within design limits for the various combinations of power sources and loads. The capability of inverter static switches to transfer without load interruption within design time delay limits will be verified.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

50. PREOPERATIONAL TEST - 125 V DC DISTRIBUTION

Prerequisites for Testing

General prerequisites have been met. All circuits have been terminated and released to the operating staff. Individual component testing has been completed on battery chargers and station batteries.

Test Objective and Summary

Testing will verify that the batteries and battery chargers function to provide their required charge and discharge rates and load carrying capabilities. This program includes a test of the ability of the chargers to restore the battery (i.e., duty cycle) from a discharged to fully charged condition with a demand on the system equal to the largest combined demands of the various steady state loads. The interlocks between bus tie breakers will be tested to verify proper operation.

Acceptance Criteria

Each battery will be verified capable of supplying 100 percent of its capacity. Each battery charger can operate in float and equalize modes and supply rated continuous current at specified voltage levels. Operation of breaker interlocks to prevent paralleling two buses through the spare charger will be verified.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

51. PREOPERATIONAL TEST - DIESEL GENERATOR

Prerequisites for Testing

General prerequisites have been met. Component testing of the diesel generator and its support systems has been completed. Fuel oil, cooling, air start, fire protection, and ventilation systems have been tested and are ready for service.

Test Objective and Summary

Testing will verify that the diesel generators and supporting equipment will perform in accordance with design. The testing objectives will conform to the general requirements of Regulatory Guide 1.108. They will verify that the diesel generator is capable of operating in parallel with site power, or alone on the emergency bus. This test will primarily confine itself to verifying the diesel generator's capability to operate as an electrical power source. The preoperational test of engineered safety features with loss of normal power, together with this test, will demonstrate the generator's capability to supply power under emergency conditions.
The specific areas to be covered by this test are as follows.

1. The diesels will be operated for a 24 hour full load test including a 2 hour segment at the 2 hour load rating. The required voltage and frequency as well as proper cooling system operation will be verified.

2. The ability to synchronize with offsite power, transfer loads, isolate the diesel and return to standby will be verified.

3. The ability of the diesels to operate during forwarding of fuel from storage tanks to day tanks will be verified.

4. During the combined testing of the diesels, a minimum of 34 consecutive valid tests per diesel will be performed.

5. The ability of the diesel air starting system to deliver the required starts without recharge will be verified.

6. The functional capability of the generator to sequence onto the emergency bus under full load temperature conditions will be tested in the engineered safety features test. Consequently, Item 1 may be done in that test.

7. Proper operation during load shedding will be verified. This will include a test of the loss of the single largest load and complete loss of load with the diesel initially at its maximum continuous rating. Testing will verify voltage requirements are met and that overspeed limits are not exceeded.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

8. Testing will verify that during the time the shutdown relay is energized, neither the air start solenoid nor the fuel racks will open.

During the test sequences, proper operation of each diesel generator unit will be verified through monitoring of specified parameters on the engine and generator units, control systems, interlocks, and alarms including the annunciator "first-out" capability, lubricating oil and cooling water systems, and generator breaker operation. Major supporting systems, including fuel oil, and ventilation will be monitored for proper performance.

Acceptance Criteria

The diesel generator units must meet the following acceptance criteria.

1. Temperatures, pressures, flows, voltage, and frequency are within specified design limits during normal full load and design transients (e.g., load shedding).

2. Reliability is demonstrated by at least 34 consecutive valid tests per unit. In addition to the valid test exceptions listed in Regulatory Guide 1.108, unsuccessful start and load attempts that can be attributed to a procedural error will not be considered valid tests.

3. Automatic and manual controls operate in accordance with design during startup, loading, load transfer, and shutdown.

4. The diesel air start system will supply sufficient capacity for the specified minimum number of starts of each diesel.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

52. PREOPERATIONAL TEST - DIESEL GENERATOR FUEL

Prerequisites for Testing

General prerequisites have been met. Initial component testing has been completed. An initial supply of fuel oil meeting the requirements of Regulatory Guide 1.137 is available.

Test Objective and Summary

Testing will verify that the fuel oil transfer pumps will automatically maintain the fuel oil day tank level in the design band. The ability to transfer fuel oil between fuel oil storage tanks will be verified. The ability of the fuel oil transfer pumps to maintain design flow rates will be verified. The fuel oil strainers will be inspected for presence of abnormal fouling indications following testing.

Acceptance Criteria

Fuel oil transfer pumps operate within design flow and pressure requirements. The fuel oil day tank is maintained within the specified level band through automatic makeup. No abnormal fouling of fuel oil strainers is permitted.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

53. PREOPERATIONAL TEST - RESERVE STATION SERVICE TRANSFORMERS

Prerequisites for Testing

General prerequisites have been met. Component testing on support equipment and pre-energization testing of the transformers and associated breakers has been completed. The 345 kV switchyard is available for service.

Test Objective and Summary

Testing will verify ability to energize the reserve station service transformers. Proper operation of the transformers under load will be verified during hot functional testing.

Acceptance Criteria

Voltage on the secondary of both RSST (A&B) will be verified to be in accordance with design data, and phase rotation will be verified correct.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

54. PREOPERATIONAL TEST - COMMUNICATIONS

Prerequisites for Testing

General prerequisites have been met. For the intraplant communications system test, ambient noise levels approximating those expected during normal plant operation are established.

Test Objective and Summary

Testing will demonstrate the operability of the following communications systems:

1. The sound-powered phone system

2. The voice paging/public address system

3. Offsite radio channels used for emergency communications

4. Offsite telephone circuits used for emergency communications

5. The emergency evacuation alarm

6. Maintenance jack system

Acceptance Criteria

Communications system function per design requirements. The voice paging/public address and emergency evacuation alarm systems are audible with expected ambient noise levels. Intraplant communication channels function properly and clear communications can be established off-site by telephone and radio channels.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

55. PREOPERATIONAL TEST - NUCLEAR INSTRUMENTS

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

Testing will demonstrate the capability of source, intermediate, and power range circuitry to respond to a simulated test signal, the proper operation of all operational and test circuitry including the flux deviation signal and the proper functioning of high level trip channels, alarm setpoints and the audible count rate feature. The proper response of source range detectors to a neutron source will be verified.

Acceptance Criteria

Nuclear instrument channels respond within specified limits to simulated input signals and provide proper indication and reactor protection outputs. Trip and alarm setpoints are within predetermined limits and the source range responds properly to the neutron source.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

56. PREOPERATIONAL TEST - INCORE NUCLEAR INSTRUMENTATION

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

Prior to core loading, testing will verify the response of each channel to simulated detector inputs. The system programming for flux mapping and output to the plant computer will be demonstrated.

Acceptance Criteria

The incore instrument system will operate in accordance with design to support post-fuel load checkout.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

57. PREOPERATIONAL TEST - PROCESS AND AREA RADIATION MONITORING

Prerequisites for Testing

General prerequisites have been met and necessary check sources are available.

Test Objective and Summary

Testing will verify the operability of process monitor pumps, valves, alarms, controls, interlocks, and associated instrumentation. Monitor response to known radioactive sources will be verified. The capability of selected monitors to initiate required control actions will be verified. Testing will include the containment atmospheric monitoring system and the failed fuel detection system. The proper operation of area radiation monitors, including response to known radiation sources, indication, alarm, and actuation of required control actions will be verified.

Acceptance Criteria

Monitors will respond in accordance with design. Alarm setpoints correspond to design criteria. Local and remote instrumentation, recording devices, controls, and interlocks operate in accordance with design requirements.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

58. PREOPERATIONAL TEST - ENGINEERED SAFEGUARDS ACTUATION (DIESEL SEQUENCER)

Prerequisites for Testing

General prerequisites have been met for the solid state protection system and the diesel generator sequencer.

Test Objective and Summary

Testing will verify the logic programming of the diesel generator sequencer to emergency safeguards actuation relay output from the solid state protection system. The response will be verified for both the loss of normal power and non-loss of normal power conditions. Successful completion of testing will be prerequisites to the integrated testing of safeguards systems.

Acceptance Criteria

Logic sequencing and timing are in conformance with design for both the loss of normal power and non-loss of normal power conditions.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

59. PREOPERATIONAL TEST - SOLID STATE PROTECTION SYSTEM

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

Testing will demonstrate proper operation of the reactor trip and engineered safeguards actuation logic and output signals of the solid state protection system in response to simulated input signals on each channel. Each design logic condition will be tested and proper coincidence logic verified. Fail safe operation on loss of power will be verified. The manual reactor trip up to the tripping of the reactor trip breakers will also be tested. This will include testing to individually test that a manual trip will remove power from the reactor trip breaker undervoltage coil and energize the shunt trip coil.

Acceptance Criteria

The solid state protection system produces proper logic response for specified input signals.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

60. PREOPERATIONAL TEST - PROCESS PROTECTION AND CONTROL INSTRUMENTATION RACKS

Prerequisites for Testing

General prerequisites have been met. Instrument racks have been energized and each circuit card has been placed in service.

Test Objective and Summary

The operability of each NSSS and safety-related balance of plant instrument circuit will be verified during the preoperational test of its respective system.

Acceptance Criteria

Instrument power supplies operate within design voltage and load limits. Instrument racks operate within design temperature limits.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

61. PREOPERATIONAL TEST - PROTECTION/SAFEGUARDS SYSTEM RESPONSE TIME TESTING

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

Pressure sensors used in protection/safeguards system instrument channels will be initially hydrostatically tested to determine sensor response times. This information will later be used to establish a correlation to the white noise degradation method of response time testing.
The in situ method for measuring RTD time response called the loop current step response (LCSR) will be used to initially determine sensor response time. This information will later be used to establish a correlation to the white noise degradation method of response time testing.
Electronic signals will be injected at the input of each protection/safeguards loop and the response time from that point until final actuation will be measured. This method for loop response will be used for both pressure and temperature sensors.
The algebraic sum of the loop response time and the associated sensor response time will equal a total response time.

Acceptance Criteria

The response times of instrumentation in protection/safeguards systems will be equal to or less than that required by Technical Specifications.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

62. PREOPERATIONAL TEST - DIGITAL ROD POSITION INDICATION

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

Testing will demonstrate the ability of the system to indicate rod position using simulated inputs. The proper functioning of all circuitry will be verified, including rod deviation and position monitoring outputs to the plant computer, rod bottom indications, and alarm outputs. Satisfactory completion of testing will be prerequisite to system checkout with control rods installed during post core load hot functional testing.

Acceptance Criteria

The DRPI control board display indicates the simulated input signals within specified system accuracy. Outputs to the plant computer are within specified accuracy. System alarms function to indicate abnormal conditions in accordance with design. Half accuracy of the system is verified.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

63. PREOPERATIONAL TEST - LOOSE PARTS MONITOR

Prerequisites for Testing

General prerequisites have been met. Plant will be at ambient conditions for initial alignments and normal operating temperature and pressure for integrated checkout during hot functional test phase.

Test Objective and Summary

Testing will demonstrate operability of the system including response to known calibrated signals. Alert levels will be established using the guidelines of Regulatory Guide 1.133 (9/77). Proper data acquisition in both the manual and automatic modes will be demonstrated. Successful completion of testing will be prerequisite to system checkout during the initial startup testing power ascension phase.

Acceptance Criteria

System will respond to signals above the pre-determined alert level and will not be triggered by normal deliberate plant maneuvers. Data acquisition and display systems operate as designed. System will actuate required alarms and interlocks.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

64. PREOPERATIONAL TEST - SEISMIC MONITOR

Prerequisites for Testing

General prerequisites have been met. A calibrated seismic test signal generator is available.

Test Objective and Summary

Testing will verify that the seismic monitor will activate at predetermined trigger levels. Proper operation of the system recording and playback features, peak acceleration recorders, spectrum analyzer, and alarm functions will be demonstrated.

Acceptance Criteria

The seismic monitoring system properly responds to simulated input signals.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

65. PREOPERATIONAL TEST - EMERGENCY LIGHTING

Prerequisites for Testing

General prerequisites have been met. Normal power is available.

Test Objective and Summary

Tests will be made to confirm that emergency lighting will provide minimum illumination in areas essential to safe shutdown of the plant. Testing will include interruption of essential AC lighting sources resulting in corresponding essential DC lighting being provided.

Acceptance Criteria

Emergency lighting will satisfy design criteria, including automatic actuation of the essential DC lighting on loss of corresponding essential AC lighting, and provide specified minimum lighting levels satisfactory for the safe shutdown of the plant when other lighting sources are unavailable.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

66. PREOPERATIONAL TEST - ENGINEERED SAFETY FEATURES INTEGRATED TEST WITHOUT LOSS OF NORMAL POWER

Prerequisites for Testing

General prerequisites have been met. Preoperational testing has been completed for the solid state protection system and diesel sequencer panel. Testing of safety system components required for this test has been completed such that individual equipment can be actuated. The plant computer is available for test inputs, or arrangements have been made to accurately document the status of equipment to be actuated by the safety signals initiated in this test.

Test Objective and Summary

Testing will verify that engineered safeguards signals, generated at the source, cause the appropriate safeguards components to actuate in accordance with design. In addition to verifying overlap, testing will also verify operation of reset and override functions as well as provide operators with hands on experience in operating the safeguards equipment.

The test will be initiated by simulating high containment pressure signals of sufficient magnitude to cause a safety injection signal (SIS), but not cause a containment depressurization actuation (CDA). With Train B equipment blocked, Train A equipment will be checked to ensure equipment has actuated as required by an SIS. Various override and reset functions, previously tested during system preoperational tests, will again be checked by the operators as a means of training, and to ensure they operate as designed under actual conditions. After SIS, the containment pressure signals will be increased so as to initiate a CDA. Safeguards equipment will be verified for proper actuation with a CDA signal; resets and overrides will be verified. Train B will be tested in the same way, but with Train A blocked.

Throughout the preoperational test program SIS/CDA signals will be manually initiated whenever feasible to support component testing (i.e, in support of Regulatory Guide 1.79 testing). Test/Inhibit switches associated with the diesel sequencer will be used to the maximum extent possible.

Acceptance Criteria

Equipment that is not inhibited shall actuate as required upon initiation of SIS or CDA. Reset and override signals shall function as designed.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

67. PREOPERATIONAL TEST - ENGINEERED SAFETY FEATURES TEST WITH LOSS OF NORMAL POWER

Prerequisites for Testing

General prerequisites have been met. Preoperational testing has been completed for the solid state protection system and diesel sequencer panel. Testing for safety system components has been completed such that individual equipment can be actuated and monitored to determine response to safety signals. The plant computer or other devices are available to determine the status and timing of safeguards equipment being sequenced onto the emergency diesel generators (EDG).

Test Objective and Summary

This test will demonstrate the following:

1. proper sequencing and operation of equipment under loss of normal power (LNP) conditions, with and without safeguards actuation signals; and

2. separation exists between emergency buses.

Load sequencing onto the EDGs will include conditions imposed by a safety injection signal (SIS), a containment depressurization signal (CDA), and recirculation mode subsequent to safeguards actuation. In addition, an LNP and safeguards actuation will be initiated simultaneously on both emergency buses in order to verify there is no interaction which might be detrimental to the proper sequencing and operation of components on each train.

Acceptance Criteria

Safeguards equipment shall sequence onto the EDGs and operate in accordance with design criteria.
The EDGs and their associated sequencing equipment shall function per design. Electrical separation between emergency buses shall be verified by observing that no power exists on the A (B) Emergency Bus with all power sources removed and LNP testing being conducted on the B (A) Emergency Bus.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

68. PREOPERATIONAL TEST - LEAK DETECTION

Prerequisites for Testing

General prerequisites have been met. The following systems are available for support of testing:

1. Radiation monitoring system
2. Reactor plant aerated drains
3. Reactor plant gaseous drains
4. Computer
5. Emergency safeguards area flooding indication

Instrumentation for all major vessel level indications which input the leak detection program has been calibrated and is operational.

Test Objective and Summary

Testing will verify programs, procedures and instrumentation operability for detection of:

1. reactor coolant boundary leakage; and
2. emergency safeguard area/cubicle flooding

Data from flow and level instrumentation installed in the reactor coolant and other process systems, drain systems and sumps and sump and drain pump run times will be obtained during individual system preoperational testing and volumetric correlation will be computed.
The procedures used to calculate leakage rates as well as the computer program for leak detection will be verified. Simulated or test signals will be inserted into the radiation monitoring system as necessary.
The flow and level instrumentation installed to indicate flooding of the various engineered safeguards areas or cubicles will be verified operable.

Acceptance Criteria

Systems, procedures and programs which support reactor coolant boundary leak detection function to provide data required by design and Technical Specifications. Flood detection systems function in accordance with design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

69. PREOPERATIONAL TEST - CONTAINMENT ISOLATION

Prerequisites for Testing

General prerequisites have been met. All systems containing containment isolation devices have been individually tested for operability. The engineered safeguards systems serving containment isolation have been tested.

Test Objective and Summary

Testing will demonstrate the operability of containment isolation valves and dampers in response to containment isolation (CIA and CIB) signals.

Acceptance Criteria

Containment isolation devices operate in accordance with requirements of design safety analysis.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

70. PREOPERATIONAL TEST - CONTAINMENT INTEGRATED LEAK RATE

Prerequisites for Testing

General prerequisites have been met. Type B and Type C local leak rate testing has been satisfactorily completed. Containment integrity has been established and systems aligned as required by 10 CFR Part 50, Appendix J, III.A.1. The containment leakage monitoring system has been calibrated and is available.

Test Objective and Summary

Test will be performed in accordance with 10 CFR Part 50, Appendix J requirements. The requirements of the containment structural integrity test may be met concurrently with the integrated leak rate test.

Acceptance Criteria

The containment leak rate meets the criteria imposed by 10 CFR Part 50, Appendix J.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

71. PREOPERATIONAL TEST - INTEGRATED PRECORE HOT FUNCTIONAL TESTING

Prerequisites for Testing

General prerequisites have been met. The reactor coolant system cold hydrostatic test has been completed. All preoperational testing of systems required to support hot plant operations has been completed and reviewed for adequacy for the joint test groups with all test deficiencies corrected or specifically waived.

Test Objective and Summary

Testing will demonstrate the satisfactory performance of systems and components during the heatup of the reactor coolant system (RCS), operation at normal temperature, pressure, and cooldown. Specific testing will include the following.

1. Heatup of the RCS to normal operating temperature and pressure utilizing the reactor coolant pumps and pressurizer heaters. This test will include demonstration of solid system pressure control and the capability to add hydrazine to the RCS.

2. Perform periodic vibration measurements of reactor coolant pumps.

3. Demonstrate that the operation of pressurizer pressure and level control systems including heater and spray operation. Perform preliminary spray flow adjustments.

4. Demonstrate that the operation of the steam generator atmospheric and condenser steam dump valves is acceptable within specific limits:

    a. Proper actuation, operation, reset, and response time of the valves will be demonstrated.

    b. Operability of instrumentation, controls, interlocks, and alarms will be verified.

5. Demonstrate the capability of the chemical and volume control system to provide charging water at rated flow against normal RCS pressure, verify letdown flow rate for various operating modes and verify the excess letdown and seal water flows.

6. Perform RCS incore thermocouple and RTD isothermal calibration.

7. Verify ability to maintain steam generator levels and proper operation of feedwater control systems, steam dumps and level instrumentation.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

8. Demonstrate proper functioning of the main steam isolation valves at normal operating temperature and pressure.

9. Demonstrate the proper operation of steam generator safety valves, verifying setpoints with a pressure-assist device and verifying proper reseating and leakage within specified limits.

10. Demonstrate the proper operation of pressurizer safety and relief valves, and the capability of the pressurizer relief tank to condense a steam discharge from the pressurizer.

    a. The PORV will be operated manually to confirm valve operability and the ability of the pressurizer relief tank (PRT) to condense a discharge. Leakage following operation will be verified within acceptable limits. Discharge header leakage detection instrumentation will be verified operable in accordance with design requirements.

    b. Operability of PORV and PRT instrumentation, controls, interlocks, and alarms will be verified.

    c. Safety valve leakage at RCS normal pressure will be verified within specified limits. Actual safety valve operation will be demonstrated by hydrostatic bench test to verify set points.

11. Operate the reactor coolant pumps for a minimum of 240 hours at full flow to achieve approximately 1 million vibration cycles on reactor internals. Following hot functional testing, the internals are removed and inspected for vibration effects. See Section 3.9N.2.3 for additional information on the required inspection.

12. Demonstrate the operability of remote shutdown controls.

13. Perform or complete those portions of the following system tests (see individual descriptions), which require the RCS to be at or near normal operating temperature and pressure:

    a. Reactor coolant system expansion and restraint

    b. Chemical and volume control

    c. Boron thermal regeneration

    d. Residual heat removal

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

e. Low pressure safety injection

f. High pressure safety injection

g. Reactor plant sampling

h. Containment ventilation

i. Auxiliary building ventilation

j. Engineered safety features building HVAC

k. Main steam

l. Steam dump control

m. Steam generator blowdown

n. Main feedwater

o. Steam generator water level control

p. Auxiliary feedwater

q. Service water

r. Reactor plant component cooling

s. Reactor plant chilled water

t. Charging pump cooling

u. Safety injection pump cooling

v. Neutron shield tank cooling

w. Steam generator chemical feed

x. Reserve station service transformers

y. Loose parts monitor system

z. Reactor coolant and associated system piping vibration

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

aa. Thermal expansion of piping and components of secondary systems

14. Perform or complete tests as necessary to ensure the operability of the following systems:

    a. Condensate system

    b. Extraction steam system

    c. Feedwater heater drains and vents system

    d. Turbine plant component cooling system

    e. Turbine plant sampling system

    f. Normal AC power distribution system

15. Perform a controlled plant cooldown, using the steam dump and residual heat removal systems. Demonstrate the capability to de-gas and add hydrogen to the RCS.

16. Demonstrate that the operation of the main steam control valves is acceptable within specific limits. Proper actuation and response time of these valves will be demonstrated.

Acceptance Criteria

Systems and components tested will meet specified design, safety analysis, and Technical Specification requirements.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

72. PREOPERATIONAL TEST - REACTOR COOLANT AND ASSOCIATED SYSTEM EXPANSION AND RESTRAINT

Prerequisites for Testing

General prerequisites have been met. System is ready for hot functional testing. Instrumentation is in place for tests.

Test Objective and Summary

The objective of the test will be to observe, measure and record pipe and component movement during heatup and cooldown. Position of hangers, pipe and restraints will be recorded before heatup and at specified temperature plateaus. Piping will undergo visual monitoring during all phases of the test to verify unrestricted expansion. After cooldown, pipe position will be checked against position noted before heatup.

Acceptance Criteria

Piping and components demonstrate unrestricted motion within design limits during heatup and cooldown. No deformation or interference will be permissible.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

73. PREOPERATIONAL TEST - REACTOR COOLANT AND SELECTED SYSTEMS PIPING VIBRATION

Prerequisites for Testing

General prerequisites have been met. Systems are ready for hot functional testing. Instrumentation is in place for test.

Test Objective and Summary

Testing will measure vibration levels of selected portions of the reactor coolant and other selected high and medium energy piping systems in various operational modes prior to and during hot functional testing. Non instrumented piping will be inspected during system operation to ensure vibration levels are within acceptable limits.

Acceptance Criteria

Vibration levels are within specified limits.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

74. PREOPERATIONAL TEST - THERMAL EXPANSION OF PIPING AND COMPONENTS OF SECONDARY SYSTEMS

Prerequisites for Testing

General prerequisites have been met. Secondary system components, controls, and support systems have been tested and are ready for hot functional testing. Necessary hangers, supports, and restraints have been installed and measurement locations have been designated and prepared.

Test Objective and Summary

Test objective will be to measure and observe secondary system piping and component movement during the heatup and cooldown. Measurements will be taken in selected areas before heatup, during heatup, at hot steady state, and final ambient temperature following cooldown. During testing, observations will be made to verify unrestricted motion and acceptable clearances.

Acceptance Criteria

Motion of each component will be verified to be within design limits, and no resultant interference or deformation.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

75. PREOPERATIONAL TEST - CONTROL SYSTEM TEST FOR TURBINE RUNBACK OPERATION

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

Test signals will be injected to test the whole system.

Acceptance Criteria

After tripping the logic system the load reference reduction will runback in accordance with the design requirements.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

76. PREOPERATION TEST - REACTOR COOLANT LOOP ISOLATION VALVES

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

This test will verify the operability of the reactor coolant isolation valves. The valves will be cycled. Proper operation of system controls, interlocks, and alarms will be verified.

Acceptance Criteria

The reactor coolant isolation valves function in accordance with design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

77. PREOPERATIONAL TEST - CONDENSATE AND CONDENSATE STORAGE

Prerequisites for Testing

General prerequisites have been met. Interfacing portions of other systems are available.

Test Objective and Summary

Testing will demonstrate the operability of the condensate system. Proper operation of system components will be verified. Flow paths and makeup capability will be demonstrated. Proper operation of system controls and alarms, including hotwell level control will be verified.

Acceptance Criteria

The condensate pumps meet design performance requirements. Controls and alarms function properly.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

78. ACCEPTANCE TEST - TURBINE PLANT SAMPLING

Prerequisites for Testing

General prerequisites have been met. Installation of all sample lines and instrumentation from the remote sample points to local stations are complete and ready for service.

Test Objective and Summary

Test objective will be to demonstrate that samples can be taken from turbine plant systems during cold and hot functional testing. Testing will be performed to insure that proper sample flow rates can be regulated and that cooling water flow to sample heat exchangers is adequate.

Acceptance Criteria

Sample system must demonstrate the capability to operate within design pressure, temperature and flow conditions, manufacturer’s recommendations and needs of plant operation.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

79. ACCEPTANCE TEST - TURBINE PLANT COMPONENT COOLING

Prerequisites for Testing

General prerequisites have been met. Service water system is operational. Plant is at cold ambient conditions for verification of control and interlock operation, and at normal operating temperature for verification of thermal-hydraulic performance during hot functional testing.

Test Objective and Summary

Testing will demonstrate the capability of the turbine plant component cooling system to supply adequate cooling to its components. Specific testing will:

1. demonstrate system component operability, control, alarm, and interlock functions;

2. verify that components served by the system receive adequate cooling under normal and emergency operating conditions and that thermal and hydraulic parameters are in accordance with design; and

3. achieve flow balancing to the maximum extent practicable prior to power operation. Adjustments required by added heat loads will be made in the startup test phase.

Acceptance Criteria

The system thermal-hydraulic performance meets design requirements. Control, alarm and interlock functions perform in accordance with design.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

80. ACCEPTANCE/PREOPERATIONAL TEST - HEAT TRACING

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

Heat tracing circuits are tested and inspected prior to the installation of piping insulation for conformance to vendor drawings and specifications (construction function). Conformance to specifications is reverified following installation of piping insulation. Instrumentation, controls, and alarms/annunciators are verified.

Acceptance Criteria

Conformance will meet design specifications.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

81. PREOPERATIONAL TEST - REFUELING WATER STORAGE TANK COOLING

Prerequisites for Testing

General prerequisites are met.

Test Objective and Summary

Testing will demonstrate the capability to cool the refueling water storage tank including the performance of the refueling water storage tank recirculation pumps. Proper operation of system controls and alarms will be verified.

Acceptance Criteria

The refueling water recirculation system meets design specifications.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

82. PREOPERATIONAL TEST - REACTOR VESSEL HEAD VENT

Prerequisites for Testing

General prerequisites have been met.

Test Objective and Summary

The ability to vent the reactor vessel through the head vent system will be verified during the initial fill of the reactor coolant system. Controls and alarms will be checked.

Acceptance Criteria

The reactor vessel head vent system operates per design requirements.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

83. ACCEPTANCE TEST - CONDENSER AIR REMOVAL

Prerequisites for Testing

General prerequisites are met. Plant may be at ambient temperature or at hot functional conditions as required by individual test procedures. Condensate, auxiliary steam, circulating water, and other support systems will be available as required.

Test Objective and Summary

Testing will verify the ability to draw and maintain vacuum. Performance of the condenser air removal pumps and other components will be monitored. Control functions and alarms will be verified.

Acceptance Criteria

The condenser air removal system must demonstrate the capability to draw and maintain vacuum in accordance with design requirements.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

84. ACCEPTANCE TEST - LEAK TEST OF SPENT FUEL POOL GATES AND TRANSFER TUBE

Prerequisites for Testing

General prerequisites have been met. The spent fuel pool is filled.

Test Objective and Summary

The spent fuel pool gates will be installed and the seals inflated. Once the seals are in they will be checked for proper inflation pressure and tightness.
The fuel transfer tube blind flange will be installed and leak tested.

Acceptance Criteria

The spent fuel pool gates maintain inflation pressure. The fuel transfer tube blind flange seals do not leak.

TABLE 14.2–1 PREOPERATIONAL/ACCEPTANCE TEST PROGRAM TEST DESCRIPTIONS

85. PREOPERATIONAL TEST - MECHANICAL AND HYDRAULIC SNUBBERS

Prerequisites for Testing

General prerequisites have been met. System is ready for hot functional testing. All snubbers required to be operable as listed in Tables 3.7-4a and 3.7-4b of Technical Specifications have satisfied a preservice examination during the construction phase which contains, as a minimum, verification that:

1. there are no visible signs of damage or impaired operability as a result of storage, handling, or installation;

2. the snubber location, orientation, position setting, and configuration (attachments, extensions, etc.) are according to design drawings and specifications;

3. snubbers are not seized, frozen, or jammed;

4. adequate swing clearance is provided to allow snubber movement;

5. if applicable, fluid is to the recommended level and is not leaking from the snubber system; and

6. structural connections such as pins, fasteners, and other connecting hardware such as lock nuts, tabs, wire, and cotter pins are installed correctly.

Those snubbers exceeding a time interval of 6 months between initial preservice examination and preoperational testing have satisfied a reexamination of Items 1, 4, and 5.

Test Objective and Summary

The test objective will be to verify snubber thermal movements for systems whose operating temperature exceeds 250°F. Prior to heatup, snubber position will be recorded. At essentially normal operating temperature snubber positions will be recorded and evaluated to verify expected thermal movement and adequate swing clearance. In addition to this, during initial heatup and cooldown, measurements of selected snubbers will be taken at specified intervals to verify expected thermal movement and adequate swing clearance. Any discrepancies or inconsistencies will be evaluated and corrected, if necessary, prior to proceeding to the next specified interval. For those snubbers on systems that do not attain operating temperature during hot functional testing, verification that the snubber will accommodate protected thermal movement will be done by visual observation and examination of snubber clearance.

Acceptance Criteria

Movement of each snubber will be verified to be within design limits. No contact with or potential interference from any adjacent object will be permissible.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS

(INDEX)

TEST Number	TEST NAME
1.	INITIAL CORE LOAD
2.	POST-CORE HOT FUNCTIONAL
3.	CONTROL ROD DRIVE MECHANISM OPERATIONAL TEST
4.	ROD POSITION INDICATION
5.	ROD DROP TIME MEASUREMENT
6.	ROD CONTROL SYSTEM
7.	PRESSURIZER SPRAY AND HEATER CAPABILITY AND SETTING CONTINUOUS SPRAY FLOW
8.	RESISTANCE TEMPERATURE DETECTOR BYPASS LOOP FLOW VERIFICATION
9.	REACTOR COOLANT SYSTEM FLOW MEASUREMENT
10.	REACTOR COOLANT SYSTEM FLOW COASTDOWN
11.	MOVEABLE INCORE DETECTOR SYSTEM
12.	OPERATIONAL ALIGNMENT OF PROCESS TEMPERATURE INSTRUMENTATION
13.	COMPUTER PROGRAMS TEST
14.	VIBRATION AND LOOSE PARTS MONITORING SYSTEM
15.	WATER CHEMISTRY CONTROL
16.	RADIATION SURVEY
17.	INITIAL CRITICALITY
18.	LOW POWER PHYSICS TEST
19.	BORON REACTIVITY WORTH MEASUREMENT
20.	PSEUDO ROD EJECTION TEST
21.	NATURAL CIRCULATION
22.	POWER ASCENSION TEST
23.	DYNAMIC AUTOMATIC STEAM DUMP CONTROL
24.	AUTOMATIC STEAM GENERATOR LEVEL CONTROL
25.	SHUTDOWN FROM OUTSIDE THE CONTROL ROOM

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
26.	STATION BLACKOUT
27.	MAIN STEAM ISOLATION VALVE (MSIV) CLOSURE TEST
28.	OPERATIONAL ALIGNMENT OF NUCLEAR INSTRUMENTATION
29.	PROCESS AND EFFLUENT RADIATION MONITORING SYSTEM
30.	CORE PERFORMANCE
31.	POWER COEFFICIENT MEASUREMENTS
32.	AXIAL FLUX DIFFERENCE INSTRUMENTATION CALIBRATION
33.	VENTILATION SYSTEM OPERABILITY
34.	TURBINE GENERATOR AND FEEDWATER TURBINE OPERABILITY TEST
35.	CALIBRATION OF STEAM AND FEEDWATER FLOW INSTRUMENTATION AT POWER
36.	AUTOMATIC REACTOR CONTROL
37.	LOAD SWING TEST
38.	AUXILIARY COOLANT SYSTEMS PERFORMANCE TEST
39.	UNIT TRIP FROM 100-PERCENT TEST
40.	WARRANTY RUN
41	SECONDARY PLANT PERFORMANCE
42.	CONTAINMENT PENETRATION TEMPERATURE MONITORING

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
1.	STARTUP TEST - INITIAL CORE LOAD See Section 14.2.10.1.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
2.	STARTUP TEST - POST-CORE HOT FUNCTIONAL See Section 14.2.10.2.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
3.	STARTUP TEST - CONTROL ROD DRIVE MECHANISM OPERATIONAL TEST
	Prerequisites for Testing: The rod control system is installed including drive shafts, digital rod position indication detectors and attached rod control cluster assemblies. The reactor coolant system is filled and vented, at ambient conditions with the reactor core installed and all rods fully inserted, with boron concentration equal to or greater than that required for fueling shutdown.
	Test Objective and Summary: Test will demonstrate proper mechanism timing during control rod insertion and withdrawal operations.
	Acceptance Criteria: Control rod drive mechanism timing and operation conforms to proper mechanism operation as described in the technical manual.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
4.	STARTUP TEST - ROD POSITION INDICATION
	Prerequisites for Testing: Preoperational testing of the digital rod position indication (DRPI) system is complete. Calibrated instrumentation is available. The plant is at hot shutdown no-load operating temperature prior to initial criticality.
	Test Objective and Summary: Testing will demonstrate that all rods operate satisfactorily over the entire range of travel and to verify that the DRPI system satisfactorily performs the required indication and alarm functions under hot shutdown conditions. Each control rod will be fully withdrawn and inserted in increments and individual rod position indication and group step indication data is recorded. Alarm actuation will be verified.
	Acceptance Criteria: The DRPI system performs indication and alarm functions over the entire range of travel within values specified in plant technical specifications.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
5.	STARTUP TEST - ROD DROP TIME MEASUREMENT
	Prerequisites for Testing: Plant is at cold shutdown following fuel load. Initial system preoperational testing and the control rod drive mechanism operational test has been completed. The plant will be heated to hot no load temperature and pressure conditions for the hot drop time testing.
	Test Objective and Summary: Testing will measure the drop time of each full length rod with the reactor coolant system (RCS) in a cold condition to confirm satisfactory operation prior to plant heatup. Rods exhibiting the drop times outside a two-sigma data limit will undergo additional drop testing to verify performance. Testing will be performed with the RCS at hot zero power full flow conditions for data comparison with cold tests.
	Acceptance Criteria: Rod drop times meet the requirements specified in plant technical specifications.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
6.	STARTUP TEST - ROD CONTROL SYSTEM
	Prerequisites for Testing
	Rod control system and rod position indication has been satisfactorily preoperationally tested. Rod drop tests and mechanism timing alignment has been satisfactorily completed. The plant is at hot no load temperature and pressure prior to initial criticality.
	Test Objective and Summary
	Test will demonstrate that the rod control system satisfactorily performs the required control and indication functions. Rod sequences, control functions, protective interlocks, status lights, alarms, and indications will be tested to verify proper operations.
	Acceptance Criteria
	The rod control system performance conforms to design requirements specified in system technical manuals and the FSAR.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
7.	STARTUP TEST - PRESSIRIZER SPRAY AND HEATER CAPABILITY AND SETTING CONTINUOUS SPRAY FLOW
	Prerequisites for Testing
	Plant is in a hot shutdown condition at approximately normal temperature and pressure. Reactor core is installed, reactor coolant system is borated for fueling shutdown, and reactor coolant pumps are in service. Pressurizer instrumentation and controls are operational. Preliminary settings of spray valves and temperature alarms have been made. Pressurizer level is at the no-load level and reactor coolant system pressure is being maintained by the pressurizer heaters.
	Test Objective and Summary
	A setting will be established for the manual bypass valves around the pressurizer spray control valves to obtain an optimum continuous spray flow. Setpoint for the spray line low temperature alarms will be established after setting the manual pressurizer spray valves. Normal control spray effectiveness will be verified to be within established limits by operating the spray and recording the pressure response. Proper pressurizer heater effectiveness will be verified by operating the heaters and recording the pressure response.
	Acceptance Criteria
	Pressurizer pressure response to flow through the spray valves and heater operation will be considered acceptable if performance falls within the established allowable ranges.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
8.	STARTUP TEST - RESISTANCE TEMPERATURE DETECTOR BYPASS LOOP FLOW VERIFICATION
	Prerequisites for Testing
	Reactor core is installed, plant is at normal no load temperature and all reactor coolant pumps are running. All RTD bypass loop flow measurement devices are calibrated.
	Test Objective and Summary
	Testing will be performed to measure and determine the flow rate thru each RTD bypass loop. Data obtained will be used to calculate the reactor coolant transport time for each RTD bypass loop. During testing the low flow alarm setpoint and reset for total bypass loop flow on each reactor loop will be verified.
	Acceptance Criteria
	The reactor coolant RTD bypass loop transport time is verified to be within acceptable limits.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
9.	STARTUP TEST - REACTOR COOLANT SYSTEM FLOW MEASUREMENT
	Prerequisites for Testing
	Instrumentation to measure the temperature of each loop has been installed and includes the average temperature of each loop. Elbow tap instrumentation has been installed and calibrated. All reactor coolant pumps are operational.
	Test Objective and Summary
	Testing will be conducted to relate reactor coolant loop elbow tap differential pressure to reactor coolant system flow rate. A second measurement based upon secondary plant colorimetric data will be made at 50 percent rated thermal power.
	Acceptance Criteria
	Test data will permit calculation of reactor coolant system flow rate which must be equal to or greater than 90 percent of design values specified in the FSAR prior to criticality. RCS flow will be verified greater than or equal to FSAR design values prior to exceeding 50 percent rated thermal power.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
10.	STARTUP TEST - REACTOR COOLANT SYSTEM FLOW COASTDOWN
	Prerequisites for Testing
	The reactor core is installed and the plant is at hot zero power with all reactor coolant pumps running.
	Test Objective and Summary
	During one phase of this test with a simulated power signal to the low flow protection circuitry one reactor coolant pump will be stopped and the time to obtain a low flow trip will be measured. During a second test phase all four reactor coolant pumps will be stopped and flow will be measured.
	Acceptance Criteria
	The low flow delay time must be less than or equal to the time assumed in the safety analysis when one pump is stopped. With four pumps stopped, core flow must exceed or equal that assumed in the FSAR for the first 10 seconds.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
11.	STARTUP TEST - MOVEABLE INCORE DETECTOR SYSTEM
	Prerequisites for Testing
	Plant is at hot shutdown following fuel load.
	Test Objective and Summary
	A dummy cable will be used to ensure proper operation and indexing of the drive system. The detectors will be used to verify system adequacy for incore flux mapping.
	Acceptance Criteria
	The incore instrument system will operate in accordance with design to support flux mapping during the power ascension test.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
12.	STARTUP TEST - OPERATIONAL ALIGNMENT OF PROCESS TEMPERATURE INSTRUMENTATION
	Prerequisites for Testing
	The initial alignment of the ΔT and T_{avg} instrumentation is performed prior to initial criticality with the plant in hot shutdown and all reactor coolant pumps running. Additional testing is conducted at approximately 75 percent power.
	Test Objective and Summary
	This test aligns ΔT and T_{avg} process instrumentation under isothermal conditions prior to criticality. Another alignment is performed at approximately 75 percent power to obtain extrapolated data for 100 percent power operation.
	Acceptance Criteria
	The extrapolated ΔT and T_{avg} must fall within the established allowable ranges.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
13.	STARTUP TEST - COMPUTER PROGRAMS TEST
	Prerequisites for Testing
	Process computer has been tested and is in operation. Software development necessary for program execution has been completed.
	Test Objective and Summary
	This test will verify the software associated with computer programs which use inputs to be obtained during the startup testing phase. The programs available will include:
	1. Rod supervision
	2. Data collection and reduction during moveable detector test
	3. Calorimetric
	4. Tilting factors
	5. Xenon prediction and boration
	6. Computations based on incore thermocouples
	7. Boron run-down
	8. Xenon follow
	9. Estimated critical position/shutdown margin
	10. Digital rod position indication
	Acceptance Criteria
	Program accuracy is within specified limits specified by the Nuclear Steam System Supplier.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
14.	STARTUP TEST - LOOSE PARTS MONITORING SYSTEM
	Prerequisites for Testing
	This test will be performed at approximately 30, 50, 75, 90, and 100 percent power.
	Test Objective and Summary
	This test will be conducted to establish baseline data and alarm limits for the loose parts monitoring system.
	Acceptance Criteria
	System alarms are set.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
15.	STARTUP TEST - WATER CHEMISTRY CONTROL
	Prerequisites for Testing
	The plant is at steady state conditions at approximately 0.30, 50, 75, 90, and 100 percent power.
	Test Objective and Summary
	Prior to and at criticality, and during power escalation, primary and secondary chemical analyses are performed to verify proper water quality. Samples will be taken and chemical concentrations will be adjusted to maintain chemistry specifications.
	Acceptance Criteria
	Water chemistry can be maintained within the limits specified by the manufacturer and listed in the Technical Specifications.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
16.	STARTUP TEST - RADIATION SURVEY
	Prerequisites for Testing
	The plant is at steady state conditions at approximately 30, 50, 75, 90, and 100 percent power.
	Test Objective and Summary
	Measurements will be used to verify shielding effectiveness, to identify all radiation areas for posting and access control and to verify the operability of selected area radiation monitors. Radiation survey maps will be used to designate points throughout the plant where gamma and neutron surveys will be conducted. The response of area radiation monitors will be compared with survey readings.
	Acceptance Criteria
	Neutron and gamma radiation levels are consistent with the safety analysis report and all areas are properly posted. High radiation areas have properly controlled access. Radiation monitor response is consistent with the survey results.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
17.	STARTUP TEST - INITIAL CRITICALITY
	See Section 14.2.10.3.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
18.	STARTUP TEST - LOW POWER PHYSICS TEST
	Prerequisites for Testing
	The initial criticality procedure has been completed. The reactor is critical in the low power range.
	Test Objective and Summary
	The purpose of this test is to measure temperature coefficients and rod worths at selected control rod positions. Flux maps will be performed using the incore moveable detector flux mapping system.
	Except for the flux maps, all testing will be conducted at power levels that will minimize the effect fuel heating has on reactivity. Temperature coefficient measurements and a flux map will be made with all rods withdrawn and control bank D at a controlling position. Control bank D will then be inserted and its rod worth calculated. In turn, the rod worths for other control/shutdown groups will be calculated. Throughout this procedure another set of flux maps and temperature coefficient measurements will also be performed.
	Acceptance Criteria
	Calculations and data are within the limits established by the Nuclear Steam System Supplier.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
19.	STARTUP TEST - BORON REACTIVITY WORTH MEASUREMENT
	Prerequisites for Testing
	The reactor is critical in a hot zero power condition.
	Test Objective and Summary
	The purpose of this test is to measure the boron reactivity worth. Boron concentrations will be changed and reactor coolant samples will be taken to measure each change. The control rods will be inserted or withdrawn in order to keep average temperature and power level constant. The change in reactivity corresponding to these successive rod movements will be correlated to the changes in boron concentration to give boron reactivity worth.
	Acceptance Criteria
	The calculated boron worth is consistent with Westinghouse Test predictions.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
20.	STARTUP TEST - PSEUDO ROD EJECTION TEST
	Prerequisites for Testing
	The reactor is critical in a hot zero power condition.
	Test Objective and Summary
	The purpose of this test is to verify that the hot channel factors are within assumptions made in the accident analysis. A selected RCCA will be fully withdrawn while compensating for reactivity changes with boron additions. A flux map will be taken to measure the resulting flux distributions.
	Acceptance Criteria
	The hot channel factors resulting from the RCCA withdrawal are consistent with the values assumed in the accident analysis.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
21.	STARTUP TEST - NATURAL CIRCULATION
	Prerequisites for Testing
	The low power physics test has been completed. Nuclear steam supply systems and all necessary plant secondary and auxiliary systems are operational. Plant operating procedure prerequisites are met except where special conditions required by this test state otherwise.
	Test Objective and Summary
	The purpose of this test is to demonstrate the plant's capability to remove core heat by natural circulation. The test will be initiated by tripping all reactor coolant pumps and monitoring the establishment of natural circulation.
	This test will determine the length of time necessary to stabilize natural circulation and will demonstrate the reactor coolant flow distribution by use of incore thermocouples. Effects of changes in charging flow and steam flow on subcooling margin will be determined and subcooling margin monitor performance shall be verified.
	This test shall be performed with available licensed reactor operators (RO and SRO) in the control room who will participate in the initiation, maintenance, and recovery from natural circulation mode. Data shall also be taken for feedback for the Millstone 3 simulator response to natural circulation. Operators not directly performing the test shall receive training in natural circulation on the Millstone 3 specific simulator with specific instruction in those areas where simulator response may differ from actual plant performance.
	Specific concerns of Attachment 4 to the July 8, 1981 letter from E.P. Rahe to H.R. Denton are addressed as follows.
	1. Manual operation of TDAFW pump will be performed during Preoperational Test 30, Auxiliary Feedwater. Pre-core hot functional testing will verify auxiliary feedwater system capability to maintain SG levels. Since all TDAFW pump controls are supplied from DC power sources, a loss of AC power verification test will not be performed.
	2. Pressurizer spray and heater as well as charging and steam flow effects on margin to saturation temperature will be tested.
	3,4,5. Natural Circulation Test and Station Blackout Test will be performed as Startup Tests 21 and 26, respectively.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
	Acceptance Criteria
	Natural circulation cooling can be established and maintained.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
22.	STARTUP TEST - POWER ASCENSION TEST
	Prerequisites for Testing
	The low power physics test has been completed. Nuclear steam supply systems, plant secondary systems, and all necessary auxiliary systems are operational. Plant operating procedure prerequisites are met except where special circumstances required by this test state otherwise.
	Test Objective and Summary
	The automatic steam dump control test will be among the first tests performed. The turbine generator will then be synchronized onto the grid and testing at power will begin.
	Most of the testing will occur at power level plateaus of 30, 50, 75, 90, and 100 percent. At each of these power levels both the primary and secondary systems (plus auxiliaries) will be observed for operation within design specifications. Plant instruments and test instruments will verify proper operation, not only at steady state conditions, but also for selected transients. Selected performance calculations performed by the computer will be validated. Prior to proceeding from one plateau to another, the test data will be reviewed to assure that operation at a higher power level is permissible.
	Acceptance Criteria
	The plant secondary system and associated auxiliary systems function in accordance with their design. The primary system and associated auxiliary system operate per Westinghouse specifications.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
23.	STARTUP TEST - DYNAMIC AUTOMATIC STEAM DUMP CONTROL
	Prerequisites for Testing
	Reactor is critical at a no load temperature and pressure. Steam dump valves and steam dump control system are operational. Normal condenser vacuum has been established with the circulating water system in operation. Atmospheric steam relief valve controller is in automatic and feedwater pump is in operation.
	Test Objective and Summary
	Testing will be used to verify the proper closed loop operation of the temperature average steam dump control system for both a turbine trip and load rejection. Small power increases will be utilized to verify that steam dump control can maintain the desired temperature average and that settings are correct.
	Acceptance Criteria
	Both the turbine trip controller and the load rejection controller will respond properly to testing and that there will be no divergent oscillations in temperature.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
24.	STARTUP TEST - AUTOMATIC STEAM GENERATOR LEVEL CONTROL
	Prerequisites for Testing
	Steam generator level control system has been verified as operational with preliminary setpoints determined. Alarms for the steam generators have been set as well as low-low level trip points. The reactor is critical and supplementing reactor coolant pump heat in maintaining the plant in hot standby. Turbine generator is being steam rolled with the steam dump system having been tested. All feedwater pumps are ready for operation.
	Test Objective and Summary
	The level control stability of the steam generator bypass valve in automatic control will be demonstrated at less than 10 percent reactor power. This will be accomplished by going from manual to automatic control after establishing steam generator levels above and below normal. Proper response of the automatic steam generator level control system will be demonstrated when transferring from the feedwater bypass valves to the main feedwater valves. Control of the steam generator water level will be verified during plant transient tests at normal power ratings of 30, 75, and 100 percent with testing in accordance with the NSSS recommendations.
	Acceptance Criteria
	Control system maintains level within design limits.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
25.	STARTUP TEST - SHUTDOWN FROM OUTSIDE THE CONTROL ROOM
	Prerequisites for Testing
	The plant is at a stable power level greater than or equal to 10 percent generator load.
	Individual signoffs in the prerequisites section of the test will ensure that preoperation testing of plant instrumentation, controls, and systems to be used at the remote shutdown panel, is complete.
	Test Objective and Summary
	This test will demonstrate the capability of trip and maintain the reactor in a hot standby condition, and place the reactor in cold shutdown, from outside the control room. Control will be transferred from the control room to the remote shutdown panel. With the minimum shift crew, the plant will be shut down and maintained in hot standby for 30 minutes. Pressure and temperature will then be decreased and the residual heat removal system will be placed in operation to cool the plant down to 300°F.
	Credit for cold shutdown demonstration of cooldown using the residual heat removal system may be taken for equivalent testing performance during the startup test program.
	Acceptance Criteria
	The plant can be tripped and maintained in hot standby and cooled down from outside the control room.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
26.	STARTUP TEST - STATION BLACKOUT
	Prerequisites for Testing
	The plant is in the 10 to 20 percent power range.
	Test Objective and Summary
	This test will demonstrate that the plant responds as designed following a plant trip with no offsite power. The reactor will be tripped. The diesel start, load sequencing, and plant response including natural circulation will be monitored. The turbine-driven auxiliary feedwater pump shall be run for a minimum of 2 hours with motor-driven auxiliary feedwater pumps and turbine-driven auxiliary feedwater pump cubicle ventilation secured. AC power to the inverters and battery chargers will be removed for a period of 2 hours to force battery operation.
	Acceptance Criteria
	The plant responds in accordance with design. The turbine-driven auxiliary feedwater pump will remain with design limits and pump room ambient conditions do not exceed environmental qualification limits for safety related equipment in the room.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
27.	STARTUP TEST - MAIN STEAM ISOLATION VALVE (MSIV) CLOSURE TEST
	Prerequisites for Testing
	The plant is at less than 20 percent power.
	Test Objective and Summary
	The test will verify the MSIV closure time and demonstrate that the plant responds properly to an automatic closure of the MSIVs. All MSIVs will be closed simultaneously. MSIV response times will be recorded and selected plant parameters will be monitored.
	Acceptance Criteria
	MSIV response time and plant response are consistent with the design requirements of the safety analysis report.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
28.	STARTUP TEST - OPERATIONAL ALIGNMENT OF NUCLEAR INSTRUMENTATION
	Objective for Testing
	This test will be performed at approximately 30, 50, 75, 90, and 100 percent power.
	Test Objective and Summary
	During power increases and decreases nuclear instrumentation overlap will be verified and at special power levels calorimetric calibrations will be used to adjust the gain of the power range instruments. During power ascension testing the power range flux trip setpoint will be set to prevent exceeding the target power level by greater than 20 percent or a maximum of 109 percent.
	Acceptance Criteria
	The nuclear instrumentation demonstrates the ability to achieve the operational adjustments made during the test and the satisfactory overlap between source and power ranges.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
29.	STARTUP TEST - PROCESS AND EFFLUENT RADIATION MONITORING SYSTEM
	Prerequisites for Testing
	The plant is approximately 50 percent power for testing of process and effluent radiation monitors.
	The plant is at approximately 25 and 100 percent power for testing of the failed fuel detection system.
	Test Objective and Summary
	This test will verify the operability of process and effluent radiation monitors. Testing will include the failed fuel detection system. Samples will be taken at monitored points and analyzed. The results of the analysis will be compared to the readings of the monitor.
	Acceptance Criteria
	The process and effluent monitor responses are consistent with sample results.
	The failed detection system response is consistent with sample results.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
30.	STARTUP TEST - CORE PERFORMANCE
	Prerequisites for Testing
	The plant is at steady state conditions at approximately 30, 50, 75, 90, and 100 percent power.
	Test Objective and Summary
	This test verifies that the core performance margins are within design predictions. The moveable detector system and incore thermocouples will be used to obtain data for normal rod configurations. These data will be evaluated to establish core performance parameters.
	Acceptance Criteria
	Core performance parameters are in accordance with design values throughout the permissible range of power-to-flow conditions. The nuclear peaking factors, F (Z) and F shall not exceed Technical Specification limits.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
31.	STARTUP TEST - POWER COEFFICIENT MEASUREMENTS
	Prerequisites for Testing
	Conditions are stabilized at approximately 30, 50, 75, 90, and 100 percent power.
	Test Objective and Summary
	This test will determine the power reactivity coefficients. During each power escalation, data is collected for delta T, T_{avg}, reactivity and reactor power. Analysis of the relative changes of these parameters will be used to determine the power coefficient.
	Acceptance Criteria
	Power reactivity coefficients are in accordance with design values.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
32.	STARTUP TEST - AXIAL FLUX DIFFERENCE INSTRUMENTATION CALIBRATION
	Prerequisites for Testing
	Test data is available from a minimum of three moveable detector flux maps obtained over a range of incore axial offsets. Average core thermal power from thermal power measurements performed during each flux map, and average top and bottom detector currents from each power range channel obtained during each flux map are available. Power range isolation amplifiers, summing amplifiers and function generators have been aligned. Core average axial offset from reduced flux map data is available.
	Test Objective and Summary
	Testing will consist of a number of calculations utilizing prior test data. Calculations will be used to demonstrate that the response of the excore power range detectors is linear with respect to incore axial power distribution. Calibration of the excore power range detector input and excore power range detector signals will also be performed.
	Acceptance Criteria
	Calculations and data are within the limits established by Westinghouse.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
33.	STARTUP TEST - VENTILATION SYSTEM OPERABILITY
	Prerequisites for Testing
	The plant is at approximately 30, 50, 75, 90, and 100 percent power.
	Test Objective and Summary
	This test will verify that with the plant at power, the ventilation systems in containment and the engineered safety feature building can maintain their areas within design limits. With the plant at power, air temperatures will be monitored at various locations in the designated buildings. The temperature of components cooled by the ventilation system will also be monitored.
	Acceptance Criteria
	Applicable area and component temperature are maintained within design limits.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
34.	STARTUP TEST - TURBINE GENERATOR AND FEEDWATER TURBINE OPERABILITY TEST
	Prerequisites for Testing
	The plant is at approximately 30, 50, 75, 90, and 100 percent power.
	Test Objective and Summary
	This test will demonstrate the operability of the main and feedwater turbines. Data will be recorded on turbines at various power levels.
	Acceptance Criteria
	Turbine parameters are within design limits for all power levels.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
35.	STARTUP TEST - CALIBRATION OF STEAM AND FEEDWATER FLOW INSTRUMENTATION AT POWER
	Prerequisites for Testing
	The plant is at approximately 30, 50, 75, 90, and 100 percent power.
	Test Objective and Summary
	These tests will be conducted with the plant in a steady state condition. Feedwater flow signals will be checked against special test instrumentation and steam flow will be checked against feed flow.
	Acceptance Criteria
	Steam flow and feedwater flow channels meet the required accuracy.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
36.	STARTUP TEST - AUTOMATIC REACTOR CONTROL
	Prerequisites for Testing
	Reactor is at equilibrium conditions at approximately 30 percent power. Automatic controls for pressurizer level, pressurizer pressure, steam dumps, steam generator level, and feedwater pump speed are set and operating. Reactor rod control system is in manual with control bank D positioned within the maneuvering band and all other rods are fully withdrawn.
	Test Objective and Summary
	Tests will be performed to verify that the automatic reactor control system will return the plant to equilibrium following manually initiated transients. Average temperature will be increased and decreased by 6°F above and below reference temperature. Response of the automatic controls will be recorded.
	Acceptance Criteria
	Average temperature returns to within plus or minus 1.5°F of reference temperature.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
37.	STARTUP TEST - LOAD SWING TEST
	Prerequisites for Testing
	The plant is at approximately 30, 50, 75, and 100 percent power.
	Test Objective and Summary
	This test will demonstrate that the plant responds as designed following load changes. At selected power plateaus the turbine generator output will be increased or decreased as rapidly as possible. For load changes of 10 percent at the 75 percent power plateau or greater the maximum design load reject capability will be tested. During the performance of these tests, recordings are analyzed for the behavior of control systems and the need for realignment.
	Acceptance Criteria
	The plant can achieve steady state operation in automatic control. The plant can also handle these load changes without tripping, lifting primary safety valves, or initiating safety injection.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
38.	STARTUP TEST - AUXILIARY COOLANT SYSTEMS PERFORMANCE TEST
	Prerequisites for Testing
	The plant is at 100 percent power and applicable coolant systems are in normal operating lineups.
	Test Objective and Summary
	This test will verify that various cooling systems can maintain components within design limits with the minimum design coolant flow available. The coolant systems to be tested are those that supply the neutron shield tank, penetration coolers and ventilation systems for engineered safeguard features. Applicable coolant systems will be fully loaded at power. Data will be taken on designated equipment.
	Acceptance Criteria
	All component temperatures are within design limits.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
39.	STARTUP TEST - UNIT TRIP FROM 100-PERCENT TEST
	Prerequisites for Testing
	The plant is at 100 percent power with the electrical distribution system aligned for normal full power operation.
	Test Objective and Summary
	This test will demonstrate that the dynamic response of the plant to a full load trip is in accordance with design requirements. The test will be initiated by a trip of the generator main breaker. Data will be recorded to determine the response of control systems to the trip.
	Acceptance Criteria
	The plant is able to achieve steady state conditions after the trip without lifting primary safeties or initiating safety injection.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
40.	STARTUP TEST - WARRANTY RUN
	Prerequisites for Testing
	The plant is at 100 percent power.
	Test Objective and Summary
	This test will prove the reliability of the NSSS system. The plant will be maintained at rated power for 100 hours. Appropriate data will be recorded to allow plant performance to be analyzed.
	Acceptance Criteria
	The plant operates within the design limits specified by Westinghouse and there are no unexpected trends at the end of the run.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
41.	STARTUP TEST - SECONDARY PLANT PERFORMANCE
	Prerequisites for Testing
	The plant is at approximately 30, 50, 75, 90, and 100 percent power.
	Test Objective and Summary
	The test will demonstrate the secondary plant performs as designed. Temperature, pressure, and flow data will be obtained in the feedwater, feedwater heater, and extraction steam system. Adjustments to the feedwater level control system and other control instrumentation are expected.
	Acceptance Criteria
	Systems and components tested will meet design specifications.

TABLE 14.2–2 STARTUP TEST DESCRIPTIONS (CONTINUED)

(INDEX)

TEST Number	TEST NAME
42.	STARTUP TEST - CONTAINMENT PENETRATION TEMPERATURE MONITORING
	Prerequisites for Testing
	The plant is at approximately 30, 50, 75, 90, and 100 percent power.
	Test Objective and Summary
	Testing will monitor the temperature of hot penetrations serviced by reactor plant component cooling. Additionally, testing will monitor the temperature of other penetrations determined to be hot penetrations but not serviced by reactor plant component cooling.
	Acceptance Criteria
	Reactor plant component cooling can maintain the penetrations within design temperature limits.

TABLE 14.2–3 PREOPERATIONAL/ACCEPTANCE/STARTUP TESTS ACCEPTANCE CRITERIA SOURCES

Test No.	Test Name	Sources
P 1.	Reactor Coolant System Cold Hydrostatic Test	FSAR Table 5.4–15
P 2.	Control Rod Drive	FSAR 4.6.3; Vendor Specification 001 (Westinghouse) (W)
P 3.	Fuel Transfer	FSAR 9.1.4; Vendor Specification 001 (Westinghouse)
P 4.	Polar Crane	FSAR 9.1.4; Vendor Specification 014 (Harnischfeger)
P 5.	Volume Control (Charging and Letdown)	FSAR 9.3.4; Westinghouse NSSS SU Manual (NEU-SU-2.2.3); Westinghouse Precautions, Limitations; and Setpoints (PLS) Vendor Specifications 001 (Westinghouse) and 459 (Combustion Engineering)
P 6.	Volume Control (Boric Acid)	FSAR 9.3.4; NEU-SU-2.2.3; IEB 81-02
P 7.	Volume Control (Boron Thermal Regeneration)	FSAR 9.3.4; NEU-SU-2.2.3; Westinghouse PLS
P 8.	Fuel Pool Cooling	FSAR 9.1.3
P 9.	Containment Recirculation	FSAR 6.2.2.3
P 10.	Residual Heat Removal	FSAR 5.4.7, 6.3
P 11.	Low Pressure Safety Injection	FSAR 6.3; R.G. 1.79, 1.108
P 12.	High Pressure Safety Injection	FSAR 6.3; R.G. 1.79, 1.108
P 13.	Quench Spray	FSAR 6.2.2; R.G. 1.1, 1.26, 1.29, 1.97
P 14.	Reactor Plant Sampling	FSAR 9.3.2, 9.3.4
P 15.	Containment Local Leak Rate	FSAR 6.2.4, 6.2.6; 10 CFR 50 Appendix J
P 16.	Containment Ventilation	FSAR 6.2.5.4, 9.4.6, 9.5.10.4
P 17.	Auxiliary Building Ventilation	FSAR 9.4.2.1
P 18.	Waste Disposal Building Ventilation	FSAR 9.4.1, 9.4.8.1
P 19.	Fuel Building HVAC	FSAR 9.4.1, 9.4.8.1
P 20.	Engineered Safety Features Building HVAC	FSAR 9.4.4

TABLE 14.2–3 PREOPERATIONAL/ACCEPTANCE/STARTUP TESTS ACCEPTANCE CRITERIA SOURCES (CONTINUED)

Test No.	Test Name	Sources
P 21.	Control Building HVAC	FSAR 6.4.3, 6.4.5, 9.4.0; R.G. 1.95
P 22.	Screen House HVAC	FSAR 9.4.7.1.1
P 23.	Emergency Generator Enclosure Ventilation	FSAR 9.4.6.1.3, 9.4.5.5
P 24.	Supplementary Leak Collection and Release System	FSAR 6.2.3.3
P 25.	Main Steam	FSAR 10.3.3; NEU-SU-2.8.3, 2.8.5
P 26.	Steam Dump Control	FSAR 7.7.1.8; NEU-SU-2.8.3, 2.8.5
P 27.	Steam Generator Blowdown	FSAR 10.4.8
P 28.	Main Feedwater	FSAR 10.4.7; Vendor Specification 021 (General Electric) and 008 (Byron-Jackson)
P 29.	Steam Generator Water Level Control	FSAR 10.4.7.2
P 30.	Auxiliary Feedwater	FSAR 10.4.9
P 31.	Service Water	FSAR 9.2.1, Table 9.2–1
P 32.	Reactor Plant Component Cooling	FSAR 9.2.2.1, Table 9.2–5
P 33.	Reactor Plant Chilled Water	FSAR 9.2.2.2.1, Table 9.2–7
P 34.	Charging Pump Cooling	FSAR 9.2.2.4.2, Table 9.2–10
P 35.	Safety Injection Pump Cooling	FSAR 9.2.2.5.2, Table 9.2–12
P 36.	Neutron Shield Tank Cooling	FSAR 9.2.2.3.2
P 37.	Reactor Plant Gaseous Drains	FSAR 9.3.3; R.G. 1.70
P 38.	Instrument Air and Containment Instrument Air	FSAR 9.3.1.1.4.1; R.G. 1.68.3
P 39.	Radioactive Liquid Waste	FSAR 9.3.3, 11.2, 11.5, R.G. 1.70
P 40.	Boron Recovery	FSAR 9.3.5.1
P 41.	Radioactive Gaseous Waste	FSAR 11.3
P 42.	Radioactive Solid Waste	FSAR 11.4
P 43.	Steam Generator Chemical Feed	FSAR 10.4.7; Vendor Specification 053 (Yarway)
P 44.	Fire Protection - Water	FSAR 9.5.1

TABLE 14.2–3 PREOPERATIONAL/ACCEPTANCE/STARTUP TESTS ACCEPTANCE CRITERIA SOURCES (CONTINUED)

Test No.	Test Name	Sources
P 45.	Fire Protection - CO_2 and Halon	FSAR 9.5.1
P 46.	4 kV Normal and Emergency Distribution	FSAR 8.3.1.1, Table 8.1–2
A/P 47.	480 V Normal and Emergency Distribution	FSAR 8.3.1.1
P 48.	120 V AC Instrument Non-Vital Distribution	FSAR 8.3.1.1.1; Vendor Specification E261 (Solidstate Controls)
P 49.	120 V AC Instrument Vital Distribution	FSAR 8.3.1.1.2; Vendor Specification E622 (Elgar)
P 50.	125 V DC Distribution	FSAR 8.3.2.1; Table 8.3–5; Vendor Specification E262 (General Electric)
P 51.	Diesel Generator	FSAR 8.1.7, 9.5.6.1; R.G. 1.79; 1.108
P 52.	Diesel Generator Fuel	FSAR 9.5.4
P 53.	Reserve Station Service Transformers	FSAR 8.3.1.1, Table 8.1–2
P 54.	Communications	FSAR 9.5.2; IEB 79-18
P 55.	Nuclear Instruments	FSAR 7.7.1.3.1; Westinghouse PLS
P 56.	Incore Nuclear Instrumentation	FSAR 7.7.1.9.2; Vendor Specification 001 (Westinghouse)
P 57.	Process and Area Radiation Monitoring	FSAR 11.5; 12.3.4; Tables 11.5-1, 11.5-2
P 58.	Engineered Safeguards Actuation (Diesel Sequencer)	FSAR 8.3
P 59.	Reactor Trip (Solid State Protection System)	FSAR Table 15.0-4; Westinghouse PLS
P 60.	Process Protection and Control Instrument Racks	FSAR 7.2, 7.3; Vendor Specification 001 (Westinghouse)
P 61.	Protection/Safeguards System Response Time Testing	FSAR Chapter 15
P 62.	Digital Rod Position Indication	FSAR 7.7.1.3.2; Vendor Specification 001 (Westinghouse)
P 63.	Loose Parts Monitor	FSAR 4.4.6.4
P 64.	Seismic Monitor	FSAR 3.7.4; Vendor Specification 319 (Terra Technology)

TABLE 14.2–3 PREOPERATIONAL/ACCEPTANCE/STARTUP TESTS ACCEPTANCE CRITERIA SOURCES (CONTINUED)

Test No.	Test Name	Sources
P 65.	Emergency Lighting	FSAR 9.5.3
P 66.	Engineered Safety Features Integrated Test Without Loss of Normal Power	FSAR 7.3; R.G. 1.79
P 67.	Engineered Safety Features Test with Loss of Normal Power	FSAR 8.3.1.1.2.4; R.G. 1.108
P 68.	Leak Detection	FSAR 5.2.5.1; Technical Specifications; R.G. 1.79, 1.108
P 69.	Containment Isolation	FSAR 6.2.4
P 70.	Containment Integrated Leak Rate	FSAR 6.2.6; ANSI N45.4; 10 CFR 50 Appendix J
P 71.	Integrated Precore Hot Functional Testing	R.G. 1.68, 1.79; FSAR 3.9.2, 7.7.1, 9.3.4.4, 10.3.4, 10.4.7
P 72.	Reactor Coolant and Associated System Expansion and Restraint	R.G. 1.68; FSAR 3.9.2
P 73.	Reactor Coolant and Selected Systems Piping Vibration	R.G. 1.68; NETM-50; FSAR 3.9.2
P 74.	Thermal Expansion of Piping and Components of Secondary Systems	R.G. 1.68; NETM-50; FSAR 3.9.2
P 75.	Control System Test for Turbine Runback Operation	FSAR 7.7.1.4.2; NEU-SU-2.74, 3.13
P 76.	Reactor Coolant Loop Isolation Valves	FSAR 5.4.12, 7.6.5; Vendor Specification 001 (Westinghouse)
P 77.	Condensate and Condensate Storage	FSAR 10.4.7.4, 9.2.6.4
A 78.	Turbine Plant Sampling	FSAR 9.3.2.4, 10.4.7.4
A 79.	Turbine Plant Component Cooling	FSAR 9.2.7.4
A/P 80.	Heat Tracing	FSAR 7.6.9; IEN 79-24
P 81.	Refueling Water Storage Tank Cooling	FSAR 6.2.2.4, 6.3.4
P 82.	Reactor Vessel Head Vent	FSAR 5.4.15
A 83.	Condenser Air Removal	FSAR 10.4.2.1
A 84.	Leak Test of SFP Gates and Transfer Tube	Note 1
P 85.	Mechanical and Hydraulic Snubbers	FSAR 6.6.3

TABLE 14.2–3 PREOPERATIONAL/ACCEPTANCE/STARTUP TESTS ACCEPTANCE CRITERIA SOURCES (CONTINUED)

Test No.	Test Name	Sources
S 1.	Initial Core Load	FSAR 9.1.4, 14.2.10.1; Westinghouse Nuclear Design Report
S 2.	Post-Core Hot Functional	Note 1
S 3.	Control Rod Drive Mechanism Operational Test	FSAR 4.2.4, 7.7.1.4; NEU-SU-2.5.1; Regulatory Guide 1.68
S 4.	Rod Position Indication	FSAR 7.7.1.3.2, 7.7.1.3.3; NEU-SU-2.5.4
S 5.	Rod Drop Time Measurement	FSAR 4.2.4; NEU-SU-2.5.3; Technical Specifications; Regulatory Guide 1.68
S 6.	Rod Control System	FSAR 4.2.4, 7.7.1.2; NEU-SU-2.5.2
S 7.	Pressurizer Spray and Heater Capability and Setting Continuous Spray Flow	FSAR 5.4.10; Technical Specifications; NEU-SU-2.1.5
S 8.	Resistance Temperature Detector Bypass Loop Flow Verification	FSAR 5.4.3; NEU-SU-2.1.9
S 9.	Reactor Coolant System Flow Measurement	FSAR Table 4.4-1; Technical Specifications
S 10.	Reactor Coolant System Flow Coastdown	FSAR 5.4.3
S 11.	Moveable Incore Detector System	FSAR 7.7.1.9.2; NEU-SU-2.9.3
S 12.	Operational Alignment of Process Temperature Instrumentation	NEU-SU-2.9.6; Regulatory Guide 1.68
S 13.	Computer Programs Test	Baseline Data Acquisition
S 14.	Vibration and Loose Parts Monitoring System	FSAR 4.4.6.4
S 15.	Water Chemistry Control	Note 1
S 16.	Radiation Survey	FSAR 12.3.1
S 17.	Initial Criticality	FSAR 4.4.5, 14.2.10.3; Technical Specifications
S 18.	Low Power Physics Test	FSAR 4.4.5, 14.2.1.2; Westinghouse Nuclear Design Report
S 19.	Boron Reactivity Worth Measurement	FSAR 4.4.5; Westinghouse Nuclear Design Report
S 20.	Pseudo Rod Ejection Test	FSAR 15.4

TABLE 14.2–3 PREOPERATIONAL/ACCEPTANCE/STARTUP TESTS ACCEPTANCE CRITERIA SOURCES (CONTINUED)

Test No.	Test Name	Sources
S 21.	Natural Circulation	FSAR 14.2.10.2, 15.2.6; Regulatory Guide 1.68
S 22.	Power Ascension Test	FSAR 4.4.5, 14.2.1.2; Regulatory Guide 1.68
S 23.	Dynamic Automatic Steam Dump Control	FSAR 7.7.1.8; NEU-SU-2.8.5
S 24.	Automatic Steam Generator Level Control	FSAR 7.7.1.7; NEU-SU-2.8.2
S 25.	Shutdown from Outside the Control Room	Regulatory Guide 1.68.2
S 26.	Station Blackout	FSAR 8.3.1.1; Regulatory Guide 1.68
S 27.	Main Steam Isolation Valve (MSIV) Closure Test	FSAR 10.3.3
S 28.	Operational Alignment of Nuclear Instrumentation	Westinghouse PLS: Technical Specifications
S 29.	Process and Effluent Radiation Monitoring System	FSAR 11.5.2, 12.3.4, Tables 11.5-1, 11.5-2
S 30.	Core Performance	FSAR 4.4.5; Technical Specifications; Regulatory Guide 1.68
S 31.	Power Coefficient Measurements	FSAR 4.4.5; NEU-SU-2.9.11
S 32.	Axial Flux Difference Instrumentation Calibration	FSAR 4.4.5; Technical Specifications
S 33.	Ventilation System Operability	FSAR 9.4, Table 9.4–1; Regulatory Guide 1.68
S 34.	Turbine Generator and Feedwater Turbine Operability Test	Baseline Data Acquisition
S 35.	Calibration of Steam and Feedwater Flow Instrumentation at Power	FSAR 10.3.7; NEU-SU-2.9.4
S 36.	Automatic Reactor Control	NEU-SU-2.8.1; Westinghouse PLS
S 37.	Load Swing Test	NEU-SU-3.4.7, 3.4.8
S 38.	Auxiliary Coolant Systems Performance Test	FSAR 9.2.2, 9.2.7
S 39.	Unit Trip from 100 Percent Test	FSAR 15.2.3; Regulatory Guide 1.68

TABLE 14.2–3 PREOPERATIONAL/ACCEPTANCE/STARTUP TESTS ACCEPTANCE CRITERIA SOURCES (CONTINUED)

Test No.	Test Name	Sources
S 40.	Warranty Run	NEU-SU-3.5.1
S 41.	Secondary Plant Performance	FSAR 10.3, 10.4
S 42.	Containment Penetration Temperature Monitoring	FSAR 9.2.2.1

This listing is only a partial summary of the acceptance criteria sources used to prepare the indicated test procedures. A detailed listing will be available in each test.

NOTE:

1. The sources of acceptance criteria for these tests can be found in the test abstract descriptions.

FIGURE 14.2–1 STARTUP ACTIVITIES LOGIC DIAGRAMS

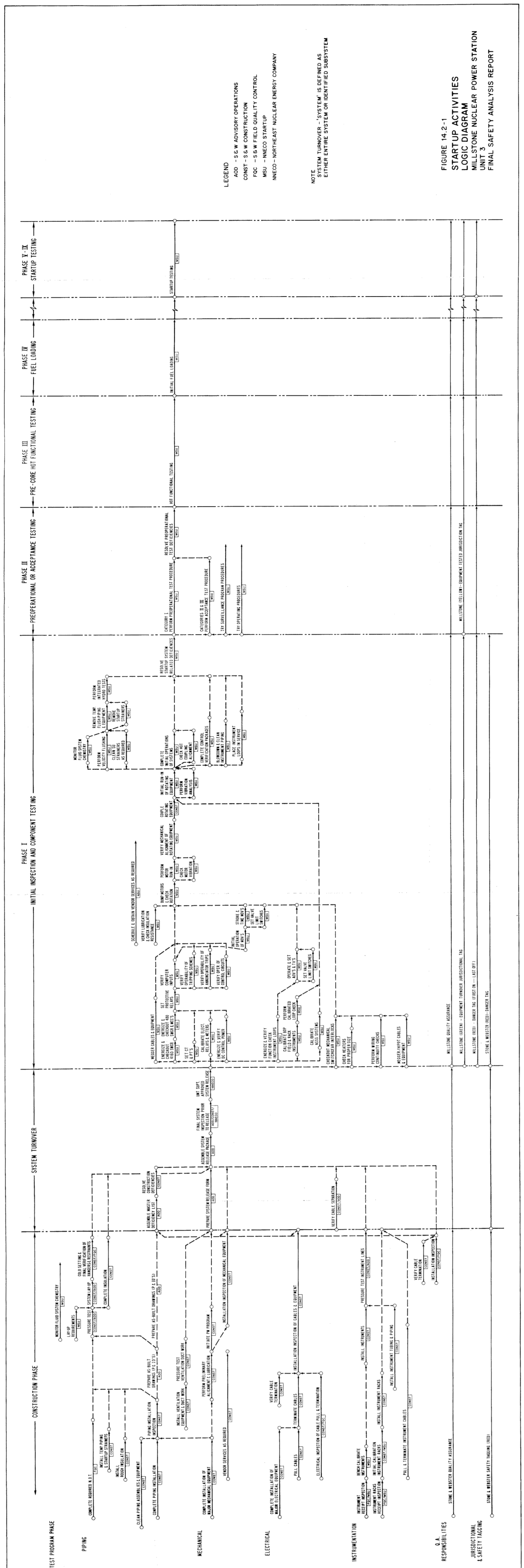


FIGURE 14.2–2 STARTUP ORGANIZATION CHART

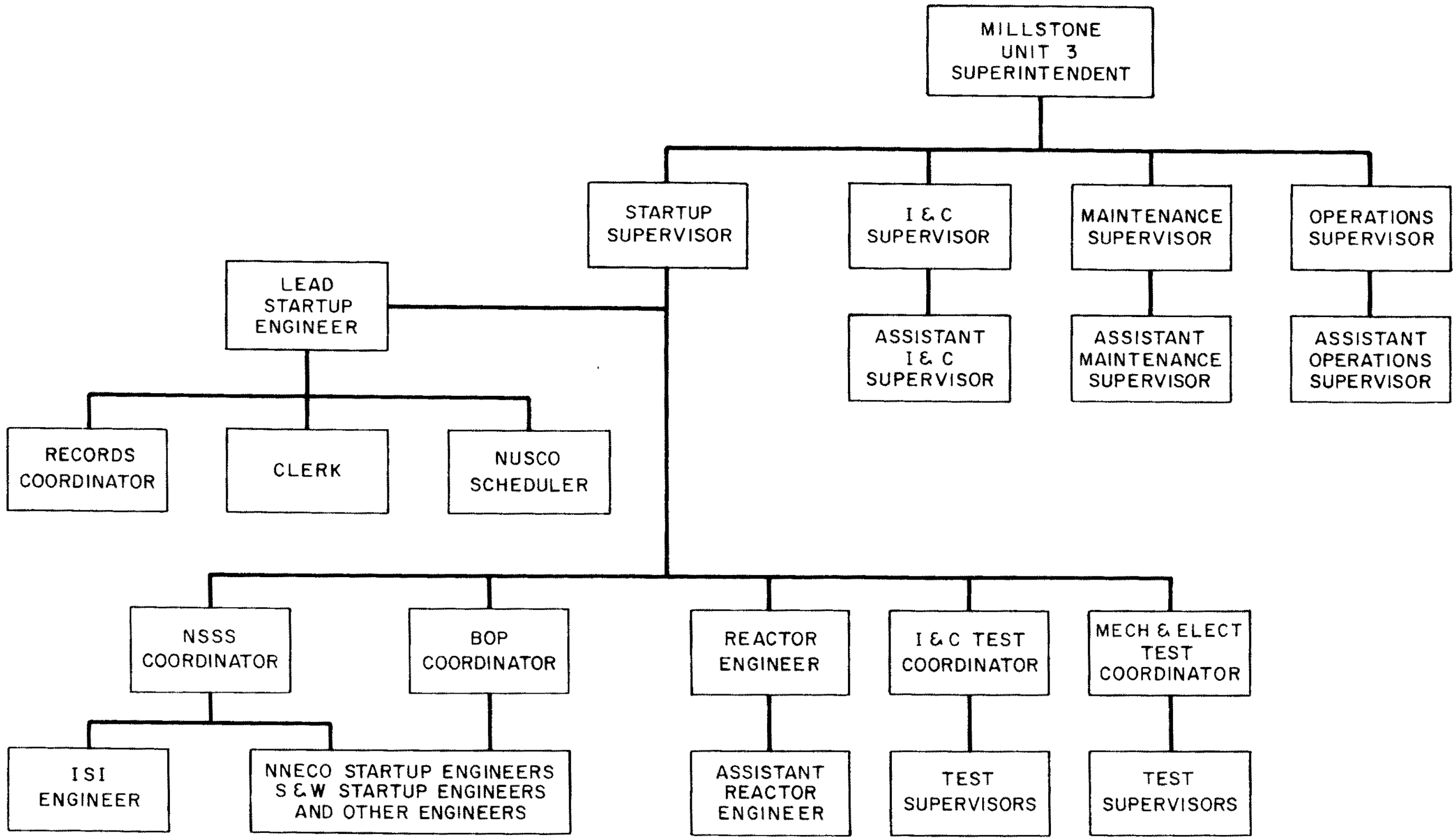


FIGURE 14.2–3 TEST PROCEDURE PREPARATION

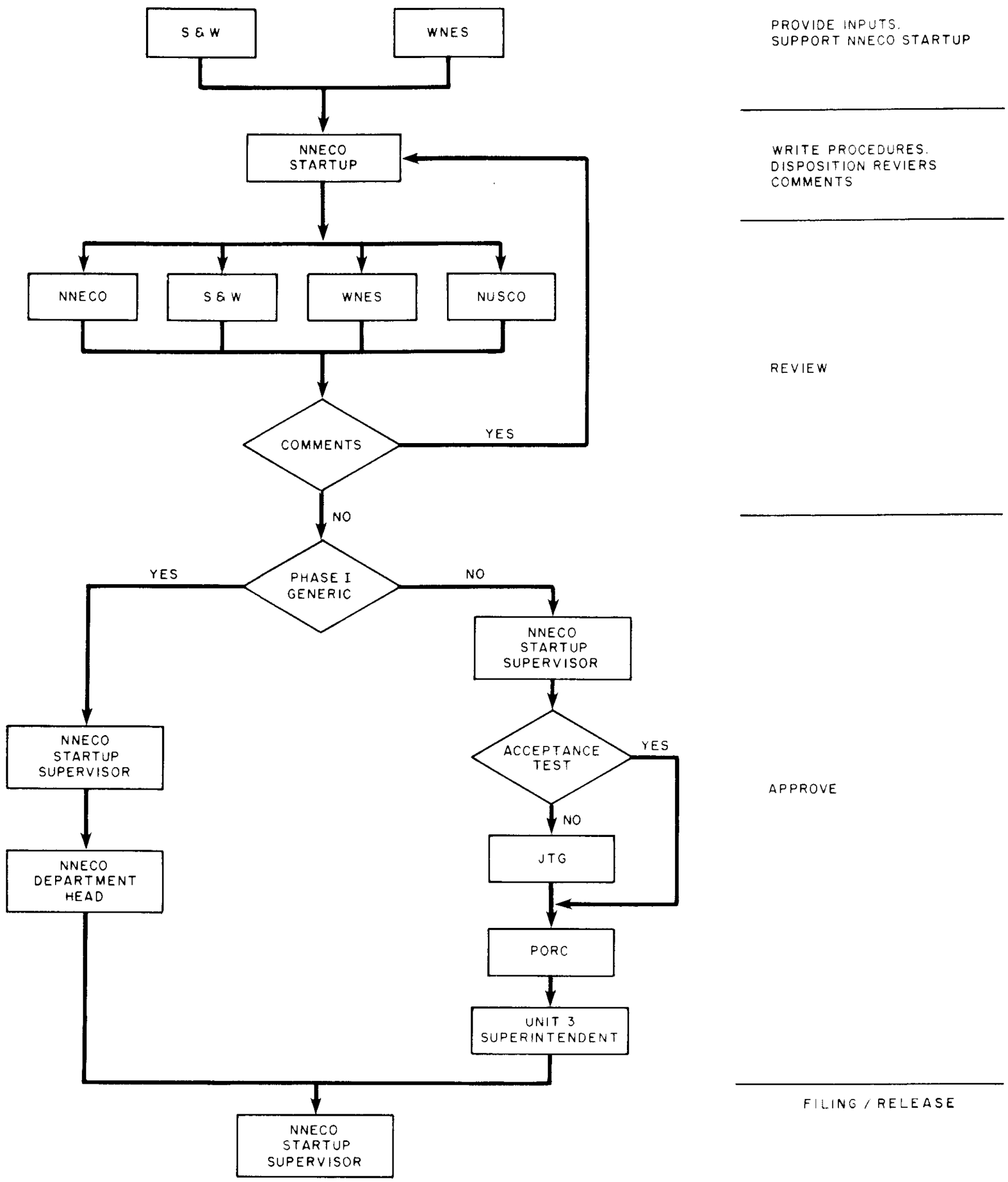


FIGURE 14.2–4 TEST PROCEDURE PERFORMANCE

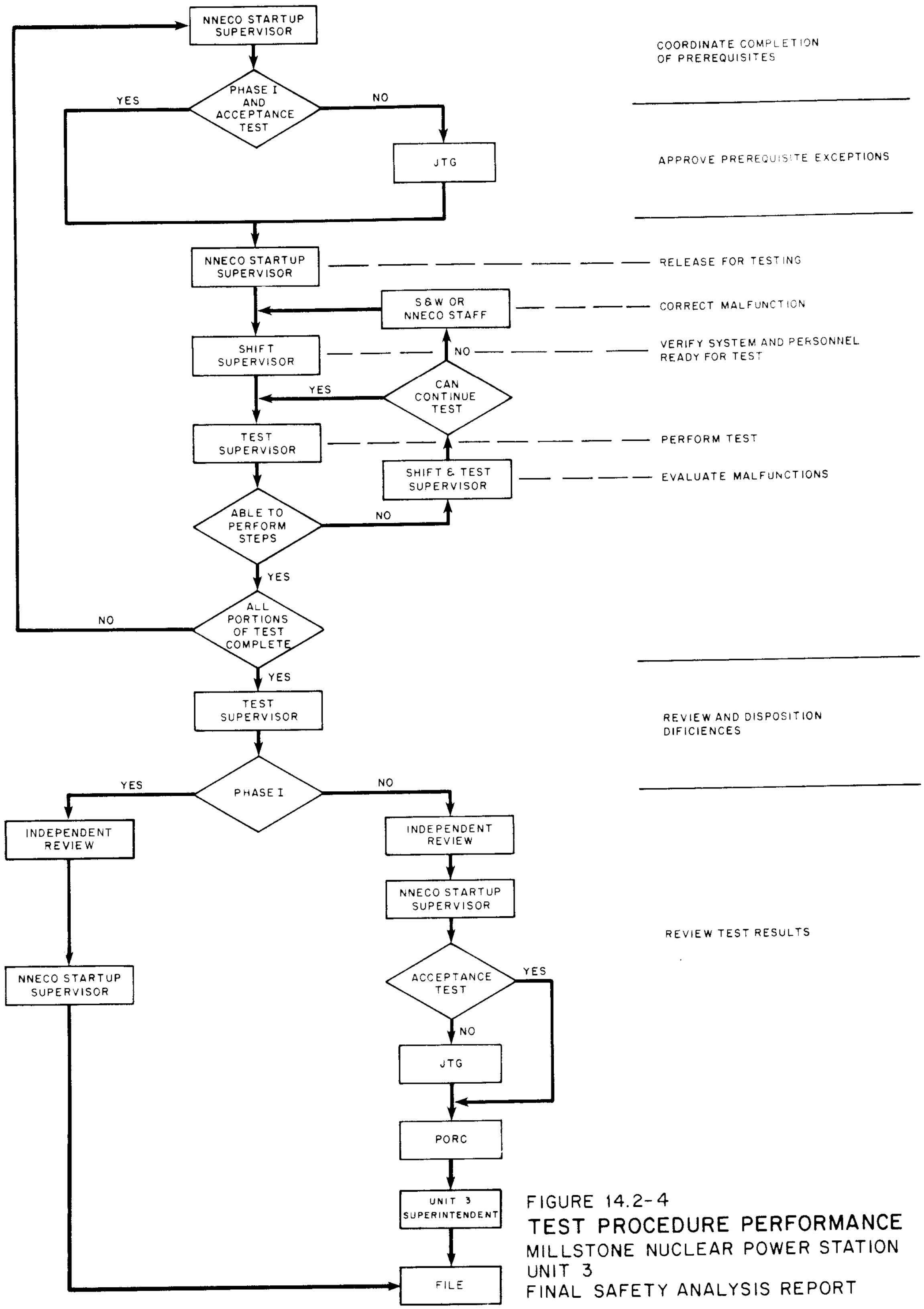


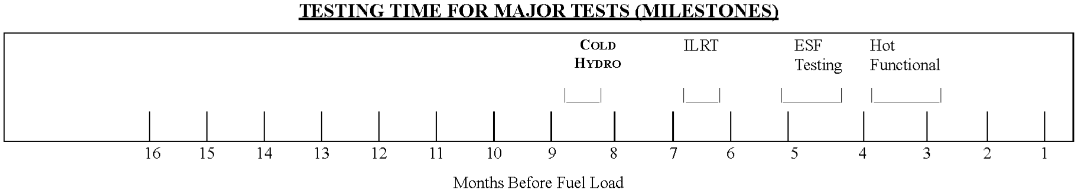
FIGURE 14.2-4
TEST PROCEDURE PERFORMANCE
MILLSTONE NUCLEAR POWER STATION
UNIT 3
FINAL SAFETY ANALYSIS REPORT

FIGURE 14.2–5 PREOPERATIONAL TEST PHASE

TESTING TIME FOR PREOPERATIONAL OR ACCEPTANCE TESTS

16 Months or Months Before Fuel Load	Between 12 & 16 Months Before Fuel Load	Between 12 & 8 Months Before Fuel Load	Between 8 & 5 Months Before Fuel Load	Within 5 Months Before Fuel Load
Primary Grade Water	Instrument Air	Auxiliary Feedwater	Radioactive Gaseous Waste	Containment Recirculating Vent
Carbon Dioxide Fire Protection	Water Fire Protection	Containment Vacuum	Feedwater	Main Steam
Halon Fire Protection	Chilled Water	Quench Spray	Reactor Plant and Gaseous Drains	Extracting Steam
Screenhouse Ventilation	Service Water	Reactor Plant Component Cooling Water	Steam Generator Level Control	N_2 Shield Tank Cooling
Chlorine	Charging Pumps Cooling	Diesel Generator and Fuel Oil	Radioactive Solid Waste	Reactor Coolant
Station Electrical Service 4.16KV	Safety Injection Pump Cooling	Containment Recirculating Spray	Spent Fuel Pool Cooling Purification	Fuel Handling
Station Electrical Service 480V	Turbine Plant Component Cooling	Process Protection and Control	Containment	Control Rod Drive
Station Electrical Service 125VDC and 125VAC		Containment Atmospheric Monitoring	Low Pressure Safety Injection	Potentially Contaminated and Vital Area Heating, Ventilating and Air Conditioning
Reserve Station Service Transformers		Containment and Condensate Storage	High Pressure Safety Injection	Nuclear Instruments
		Reactor Vessel Head Vent	Solid State Protection	Digital Incore
			Safeguards Actuation	Process and Area Radiation Monitors
			Containment Leak Monitoring	Chemical Volume Control
			Loose Parts Monitor	Digital Rod Position
			Safety Parameter Display System	Seismic Monitor
			Condensate	Boron Recovery
			Incore Thermocouples	Security
			H_2 Recombiner	Residual Heat Removal
			Reactor Plant Aerated Drains	Reactor Plant Sampling
			Radioactive Liquid Waste	Steam Dump Control
			Polar Crane	Reserve Station Service Transformers
			Emergency Lighting	Communications
			Refueling Water Storage Tank Cooling	Reactor Coolant and Associated System Expansion and Restrain
			Heat Tracing	Reactor Coolant and Selected Systems Piping Vibration
			Spent Fuel Pool Gate and Transfer Tube Leak Test	Thermal Expansion of Piping and Components of Secondary Systems
				Control System Test For Turbine Runback Operation
				Steam Generator Blowdown
				Reactor Coolant Loop Isolation Valves
				Turbine Plant Sampling
				Condenser Air Removal

TESTING TIME FOR MAJOR TESTS (MILESTONES)



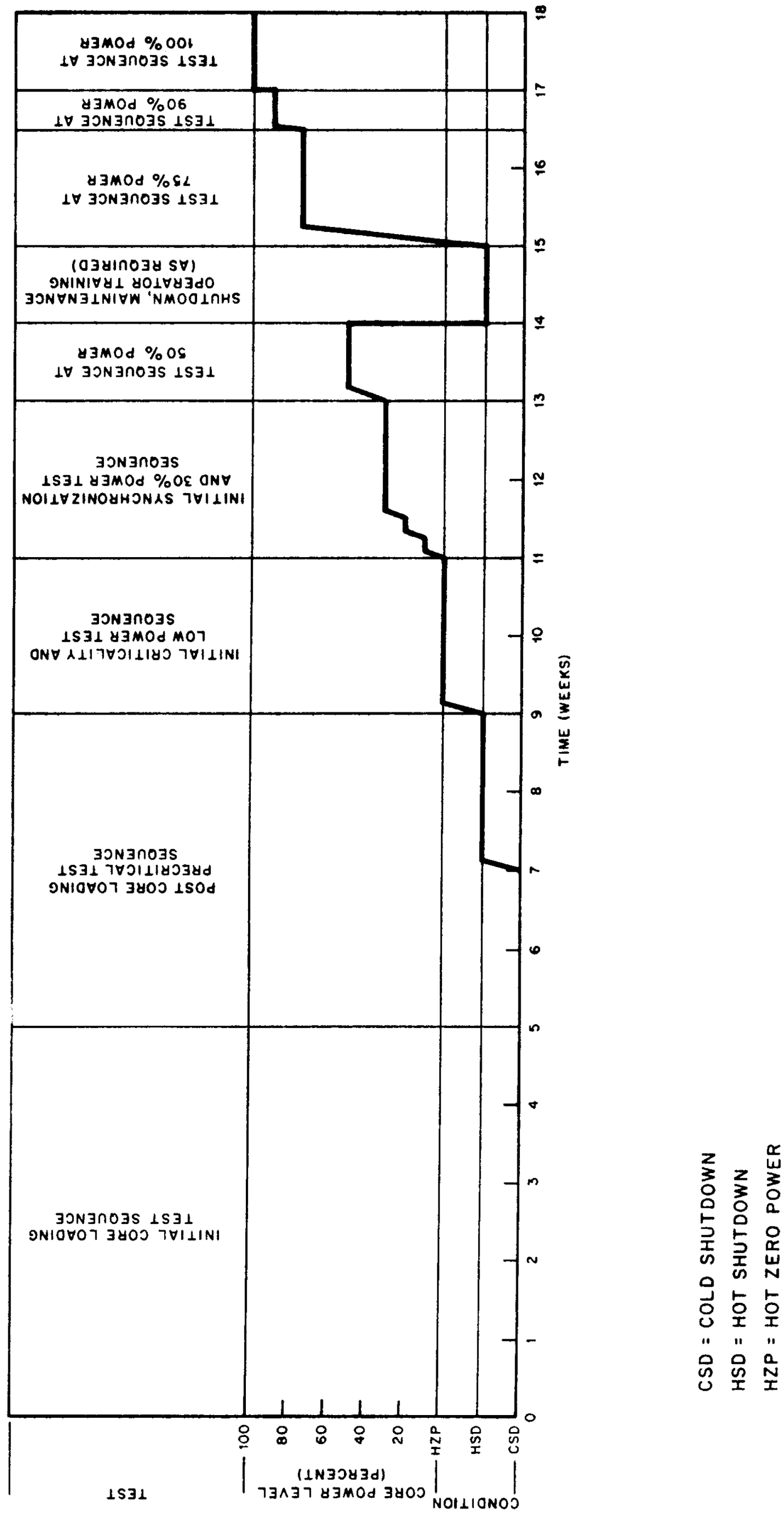


FIGURE 14.2–6 INITIAL STARTUP TEST PHASE