CHAPTER 14 - INITIAL TEST PROGRAM

TABLE OF CONTENTS

CHAPTER 14 - INITIAL TEST PROGRAM

LIST OF TABLES

CHAPTER 14 - INITIAL TEST PROGRAM

LIST OF FIGURES

CHAPTER 14 - INITIAL TEST PROGRAM

14.1 SPECIFIC INFORMATION INCLUDED IN THE PSAR

This section is not applicable to Chapter 14 of the UFSAR.

14.2 SPECIFIC INFORMATION INCLUDED IN THE FSAR

14.2.1 SUMMARY OF TEST PROGRAM AND OBJECTIVES

As construction of the systems/components is completed, the construction organization relinquishes jurisdictional control of these systems/components through a formal turnover to the licensee. Eventually all plant systems/components are turned over to the licensee.

The initial test program for each unit encompasses the scope of events that commences with system/component turnover and terminates with the completion of power ascension testing. The initial test program is conducted in two separate and sequential subprograms: the preoperational test program and the startup test program. At the conclusion of these subprograms, each unit is ready for normal power operation. Testing during the preoperational and startup test programs is accomplished in four distinct and sequential major phases.

Major Test Phases - Initial Test Program

a. Phase I - Preoperational Testing

b. Phase II - Initial Fuel Loading and Zero Power Testing

c. Phase III - Low Power Testing

d. Phase IV - Power Ascension Testing

Preoperational testing is completed during the preoperational test program. Initial fuel loading and zero power testing, low power testing, and power ascension testing are completed during the startup test program. See Figure 14.2-1 for a pictorial representation of the Unit 1 and Unit 2 initial test programs.

14.2.1.1 Preoperational Test Program

The preoperational test program is defined as that part of the initial test program that commences with system/component turnover, and terminates with the beginning of unit fuel loading. Formal tests, denoted as preoperational tests (Table 14.2-1), are conducted during this program. These tests demonstrate, to the extent practicable, the capability of structures, systems, and components to meet performance requirements, and to satisfy design requirements.

To the extent practicable, the objectives of the preoperational test program are to:

a. Verify the adequacy of plant design.

b. Verify that plant construction is in accordance with design.

c. Demonstrate proper system/component response to postulated accidents and malfunctions.

d. Confirm the adequacy of plant operating and emergency procedures.

e. Familiarize the plant staff operating, technical, and maintenance personnel with the plant operation.

14.2.1.2 Startup Test Program

The startup test program is defined as that part of the initial test program that commences with the start of nuclear fuel loading, and terminates with the completion of power ascension testing. Formal tests, denoted as startup tests (Table 14.2-2), are conducted during this program. Main steam turbine trip test for Unit 2 (ref. Startup test STP-36) at 100% power level will be performed during commercial operation of that unit. These tests confirm the design bases and demonstrate, to the extent practicable, that the plant operates and responds to anticipated transients and to postulated accidents as designed. Startup testing is sequenced to ensure that the safety of the plant is not dependent upon the performance of untested structures, systems, or components.

The objectives of the startup test program are to:

a. Accomplish a controlled, orderly, and safe initial core loading.

b. Accomplish a controlled, orderly, and safe initial criticality.

c. Conduct low power testing sufficient to ensure that design parameters are satisfied, and that safety analysis assumptions are correct or conservative.

d. Perform a controlled, orderly, and safe power ascension with requisite testing, terminating at plant rated conditions.

14.2.2 ORGANIZATION AND STAFFING

The LGS Plant Manager has overall responsibility for the initial test program. Two basic organizational units, the plant staff and the startup group, jointly conduct the different phases of the test program. Test personnel for the preoperational and startup testing will be assigned to the site in a time frame in advance of the need determined by the latest revision of the startup schedule. Sufficient numbers of qualified people will be assigned to support the startup schedule from the licensee, Bechtel Power Corporation, or vendors. In addition to these basic organizational units, the LGS Plant Manager is assisted by two review organizations: the Plant Operations Review Committee, and the Test Review Board. The organization, authority, responsibility, and degree of participation of each of these organizational units during the initial test program are described in the following sections.

14.2.2.1 Plant Staff

The plant staff consists of the permanent onsite licensee personnel responsible for the safe operation and proper maintenance of the plant. Chapter 13 describes the plant staff organization as it exists during the initial test program. Chapter 13 also establishes responsibilities and reporting relationships for principal plant staff supervisory personnel.

The plant staff is utilized, to the fullest extent practicable, during the initial test program. Specific responsibilities of the plant staff during the initial test program include:

a. Performing selected preventive and corrective maintenance.

b. Operating plant equipment.

c. Calibrating instruments, meters, and relays.

d. Performing chemical and radiological inspections and tests.

e. Providing selected required replacement and spare parts.

f. Providing the operator, technician, and appropriate maintenance support to the startup group.

g. Ensuring that vendors, consultants, and other temporary personnel assisting the plant staff, work in accordance with established procedures.

h. Confirming the adequacy of plant operating and emergency procedures.

i. Authorizing and ensuring proper documentation, identification, and restoration of temporary modifications made during the startup test program (for selected systems/components, this function may be assumed by the plant staff during the preoperational test program).

j. Authorizing and monitoring rework, modification, and maintenance during the startup test program (for selected systems/components, this function may be assumed by the plant staff during the preoperational test program).

k. Authorizing and monitoring the performance of testing during the startup test program.

l. Coordinating preparation, review, and approval of startup test procedures.

m. Coordinating performance of startup testing.

n. Coordinating review and approval of startup test results.

o. Planning and scheduling startup test program activities.

14.2.2.2 Startup Group - Organization and Responsibilities

The startup group is a temporary organizational unit established to augment the plant staff during the initial test program; their primary role is during the preoperational test program. The startup group is comprised of individuals from various organizations (Bechtel Startup, GE, the licensee, and others). Figure 14.2-2 shows the organizational structure of the startup group during the preoperational test phase, and the reporting relationships of the major constituents of the startup group. The number and timing of personnel assigned to the startup group are field determined to allow the testing effort of the initial test program to meet projected fuel load and commercial operation dates. The responsibility of principal startup group supervisory personnel, the structure of the basic constituents comprising the group, and the responsibilities delegated to the group are described in the following sections.

14.2.2.2.1 LGS Unit 2 Startup Manager

The LGS Unit 2 Startup Manager has overall responsibility for implementation of the postconstruction electrical and instrument testing, the development and implementation of the preoperational testing program (Phase I of the initial test program), and the development of the Unit 2 power ascension program (Phases II, III, and IV of the initial testing program). The Startup Manager reports to the Vice President - LGS and coordinates with the LGS Plant Manager to ensure that the safety and reliability of Unit 1 are not compromised by Unit 2 startup activities and that the adequacy and quality of the Unit 2 startup programs prove Unit 2 operability in accordance with design criteria.

The minimum qualifications for the LGS Unit 2 Startup Manager are one of the following:

a. Graduate of a 4 year accredited engineering or science college or university, plus 6 years of experience in design, testing, or operation of power plants, nuclear facilities, or similar industrial installations. At least 3 years of this experience should be associated with nuclear facilities or the individual must have training sufficient to acquaint him thoroughly with the safety aspects of a nuclear facility.

b. High school graduate, plus 15 years of experience in testing or operation (or both) of power plants, nuclear facilities, or similar industrial installations. At least 6 years of this experience should be associated with nuclear facilities or the individual must have training sufficient to acquaint him thoroughly with the safety aspects of nuclear facilities.

14.2.2.2.2 LGS Startup Superintendent - Support

The LGS Startup Superintendent - Support has overall responsibility for supervising the conduct of postconstruction electrical and instrument testing. The LGS Startup Superintendent - Support reports to the LGS Unit 2 Startup Manager on matters pertaining to postconstruction testing. The minimum qualifications for the LGS Unit 2 Startup Superintendent - Support are one of the following:

a. Graduate of a 4 year accredited engineering or science college or university, plus 5 years of experience in design, testing, or operation of power plants, nuclear facilities, or similar industrial installations. At least 2 years of this experience should be associated with nuclear facilities; or the individual must have training sufficient to acquaint him thoroughly with the safety aspects of a nuclear facility.

b. High school graduate, plus 10 years of experience in testing or operation (or both) of power plants, nuclear facilities, or similar industrial installations. At least 2 years of this experience should be associated with nuclear facilities or the individual must have training sufficient to acquaint him thoroughly with the safety aspects of nuclear facilities.

14.2.2.2.3 LGS Startup Superintendent - Operations

The LGS Startup Superintendent - Operations has overall responsibility for supervising the conduct of the startup group. The LGS Startup Superintendent - Operations reports to the LGS Unit 2 Startup Manager on matters pertaining to the initial test program.

The minimum qualifications for the LGS Startup Superintendent - Operations are one of the following:

a. Graduate of a 4 year accredited engineering or science college or university, plus 5 years of experience in design, testing, or operation of power plants, nuclear facilities, or similar industrial installations. At least 2 years of this experience should be associated with nuclear facilities; or the individual must have training sufficient to acquaint him thoroughly with the safety aspects of a nuclear facility.

b. High school graduate, plus 10 years of experience in testing or operation (or both) of power plants, nuclear facilities, or similar industrial installations. At least 2 years of this experience should be associated with nuclear facilities; or the individual must have training sufficient to acquaint him thoroughly with the safety aspects of nuclear facilities.

14.2.2.2.4 Project Startup Engineer

The Project Startup Engineer performs a line function and reports to the LGS Startup Superintendent - Operations. He assists the LGS Startup Superintendent - Operations in supervising and directing startup personnel during the applicable part of the initial test program. In the absence of the LGS Startup Superintendent - Operations, the Project Startup Engineer assumes the responsibilities of the LGS Startup Superintendent - Operations.

Minimum qualifications for the Project Startup Engineer are the same as those for the LGS Startup Superintendent - Operations.

14.2.2.2.5 Assistant Project Startup Engineer

The Assistant Project Startup Engineer performs a line function, and reports directly to the Project Startup Engineer. The Assistant Project Startup Engineer is specifically responsible for supervision of systems group leaders. Minimum qualifications for the Assistant Project Startup Engineer are one of the following:

a. High school graduate or equivalent, and 4 years of power plant experience.

b. Graduate of 4 year accredited engineering or science college, and 2 years of power plant experience.

14.2.2.2.6 Technical Staff Specialists

Technical Staff Specialists perform a staff function and report to the Project Startup Engineer. Technical Staff Specialists function as advisors to those individuals who have direct system responsibility. Technical Staff Specialists may have a secondary function within the startup group.

Typical Technical Staff Specialists assigned to the startup group might include:

a. Discipline specialists (mechanical, electrical, instrument and control, nuclear, etc.)

b. NSSS specialist

c. Turbine-generator specialist

14.2.2.2.7 Administrative Staff Specialists

Administrative Staff Specialists perform a staff function, and report to the Project Startup Engineer. Administrative Staff Specialists may have a secondary function within the startup group.

Typical Administrative Staff Specialists assigned to the startup group might include:

a. Planning and scheduling specialist

b. Startup quality engineer

c. Startup/operations coordinator

d. Startup/construction coordinator

e. Startup test coordinator

f. Startup administrative (clerical) coordinator

14.2.2.2.8 Systems Group Leaders

Systems group leaders perform a line function, and report to the assistant project startup engineer. Group leaders are assigned a staff of system startup engineers, and leaders have overall responsibility for assigned systems.

Minimum qualifications for a systems group leader are one of the following:

a. Graduate of 4 year accredited engineering or science college, and 2 years of power plant experience.

b. High school graduate or equivalent, and 4 years of power plant experience.

14.2.2.2.9 Startup Responsibilities

Specific responsibilities delegated to the startup group during the initial test program include:

a. Coordinating system/component turnovers.

b. Coordinating initial instrument, relay, and meter calibration.

c. Coordinating initial digital and analog control loop checkout.

d. Coordinating equipment initial operation.

e. Coordinating system cleanliness verification after turnover.

f. Ensuring that assigned vendors and other consultants assisting the startup group work in accordance with approved procedures.

g. Authorizing and ensuring proper identification, documentation, and restoration of temporary modifications made during the preoperational test program (for selected systems/components this responsibility may be assumed by the plant staff prior to the conclusion of the preoperational test program).

h. Documenting and reporting design problems identified during the initial test program, until licensee permanent plant procedures are implemented to perform this function, at which time this becomes a plant staff responsibility.

i. Documenting and reporting construction problems identified during the initial test program, until licensee permanent plant procedures are implemented to perform this function, at which time this becomes a plant staff responsibility.

j. Authorizing and monitoring rework, modification, and maintenance during the preoperational test program (for selected systems/components this responsibility may be assumed by the plant staff prior to conclusion of the preoperational test program).

k. Coordinating preparation, review, and approval of preoperational test procedures.

l. Coordinating performance of preoperational testing.

m. Coordinating review and approval of preoperational test results.

n. Planning and scheduling preoperational test program activities.

14.2.2.3 Plant Operations Review Committee

The PORC consists of the individuals assigned independent review responsibility per the requirements of Chapter 13. The responsibilities and reporting relationships of PORC members are also described in Chapter 13. During the initial test program, additional PORC responsibilities include reviewing startup test procedures prior to testing and reviewing startup test results. Based upon their review findings, PORC recommends to the plant manager whether the procedure and/or procedure results are acceptable or not.

14.2.2.4 Test Review Board

The TRB is a temporary review organization established specifically for the initial test program. TRB members may consist of individuals of various organizations Bechtel Startup, the licensee, PECo, or others. Figure 14.2-3 shows the organization and structure of the TRB. The TRB is responsible for reviewing preoperational test procedures prior to testing, and for reviewing preoperational test results. Based upon its review findings, the TRB recommends to the plant manager whether the procedure and/or procedure results are acceptable or not.

The LGS Plant Manager is responsible for assigning individuals to the TRB. These assignments may be either permanent or temporary. The TRB chairman is responsible for the conduct of the TRB, and reports directly to the LGS Plant Manager.

Minimum qualifications for the TRB chairman are the same as those for the LGS Startup Superintendent, identified in Section 14.2.2.2.3.

Minimum qualifications for TRB members are the same as those for the Assistant Project Startup Engineer, identified in Section 14.2.2.2.5.

14.2.3 TEST PROCEDURES

The initial test program is conducted in accordance with detailed preoperational and startup test procedures. The licensee maintains overall responsibility for test procedure preparation, review, and approval. These activities are completed as described in the following sections.

14.2.3.1 Procedure Preparation

Test procedure drafts are initially prepared by designated organizations (Bechtel Startup, GE, the licensee, or others) in accordance with the standard format of Figure 14.2-4. Specific acceptance criteria are developed using reference material such as plant Technical Specifications, FSAR Chapter 15 accident analyses, other FSAR sections, vendor topical reports, vendor technical documents, Bechtel Power Corporation design diagrams, instrument and equipment indexes, and applicable regulatory guides and codes. These specific criteria are listed in each test procedure, followed by the reference documents from which they were obtained. The completed drafts are then reviewed by cognizant design organization representatives, to ensure that the test procedure objectives and acceptance criteria are consistent with current design document requirements. Review comments are resolved between the writing organization and the cognizant design organization representative. Upon satisfactory resolution of comments, subsequent changes to test procedure objectives or acceptance criteria are based on changes to approved design documents or design organization concurrence.

14.2.3.2 Procedure Review and Approval

Following initial preparation, test procedures are processed through a formal review and approval cycle. The LGS Unit 2 Startup Manager or his designee is responsible for coordinating this process and for resolving review comments.

Preoperational test procedures are reviewed by the TRB, and startup test procedures are reviewed by the PORC. Individuals who are designated review responsibility are responsible for reviewing test procedures for accuracy, technical content, conformance with FSAR requirements, and compatibility with approved design documents. Additional specific review responsibilities include the following:

a. Verifying that procedure references have been updated to latest revisions.

b. Verifying that the procedure has been revised to incorporate design changes.

c. Verifying procedure compatibility with field installation of equipment.

d. Verifying procedure conformance with FSAR amendments, environmental Technical Specifications, and plant operating Technical Specifications.

e. Verifying that procedures reflect reactor operating and testing experiences of similar power plants.

Upon completion of initial reviews and inclusion of required changes, test procedures are submitted to the LGS Plant Manager for final approval.

Test procedure revisions and procedure modifications are processed through the same review and approval cycle.

14.2.4 CONDUCT OF TEST PROGRAM

The administrative controls that govern conduct of the plant staff and of the startup group during the initial test program are specified by administrative procedures. These administrative procedures are licensee controlled and approved documents. Administrative procedures define tasks to be performed, prescribe methods, and assign responsibilities for performing them.

The administrative procedures governing conduct of the startup group are contained in the Startup Administrative Manual. These procedures do not establish the administrative controls of other project groups or organizations, except as they interface with the startup group. Each procedure of the Startup Administrative Manual is approved for use by the appropriate authorities prior to starting the initial test program.

Station administrative procedures govern the conduct of Phases II, III, and IV of the initial test program.

The administrative procedures governing conduct of the plant staff are described in Chapter 13. The preparation, review, and approval of these procedures are also described in Chapter 13. Sufficient time is provided for procedures to be available for use, prior to the time they are required to be implemented.

14.2.4.1 Test Performance

Testing performed during the initial test program is in accordance with approved test procedures. The method for preparing, reviewing, and approving test procedures is detailed in Section 14.2.3. Before testing, a test director is assigned to each procedure. The test director is the individual designated as being responsible for coordinating test performance. Test directors are assigned from the startup group or the vendor-augmented plant staff by the LGS Plant Manager or his designee.

Specific responsibilities of the test director include, but are not limited to:

a. Verifying test prerequisites are complete and properly documented, except as provided by Section 14.2.4.2.

b. Ensuring that required test apparatus and/or equipment is available.

c. Documenting test performance on the official test copy of the procedure.

d. Ensuring that proper precautions are observed during testing.

e. Adhering to the detailed instructions of the approved procedure, except as provided by Section 14.2.4.3.

f. Ensuring that test personnel have been properly briefed.

g. Documenting and reporting test exceptions.

Minimum qualifications for a test director performing preoperational tests are one of the following:

a. High school graduate or equivalent, and 1 year of power plant or industrial experience.

b. Graduate of a 4 year accredited engineering or science college.

Minimum qualifications for a test director performing startup tests are one of the following:

a. High school graduate or equivalent, and 4 years of power plant experience.

b. Graduate of a 4 year accredited engineering or science college, and 1 year of power plant experience.

The plant operating staff is responsible for the safe and proper operation of equipment during testing. Should an unsafe condition arise, the plant operating staff takes whatever action is necessary including, but not limited to, stopping the test in order to restore safe plant conditions. During startup testing, the plant operating staff is specifically responsible for compliance with operating technical specifications, compliance with the provisions of the operating license, and authorization of testing.

14.2.4.2 Test Prerequisites

Specific test prerequisites are identified in each preoperational and startup test procedure. Figure 14.2-8 depicts some of the typical prerequisites that are included in each preoperational test procedure as applicable to the system being tested. The test director verifies that each prerequisite is completed and properly documented prior to sign-off in the official test copy of the procedure. If a prerequisite cannot be satisfied, the test director may waive the prerequisite to expedite testing. Waiving of a prerequisite is permissible only if the prerequisite has a minimal and definable effect on the test.

Waiving of a prerequisite constitutes a procedure modification; the test director is responsible for complying with the requirements of Section 14.2.4.3.

14.2.4.3 Procedure Modifications

Tests are intended to be conducted in accordance with the approved procedure; but, if necessary, a procedure may be modified to complete testing. Such modifications are documented within the text of the procedure and on a special change form for major modifications. The test director marks up the official test copy of the procedure to clearly delineate the required change, and initials and dates the change. For modifications to startup test procedures, the change is also initialed and dated by a licensed senior operator. In addition for major modifications, the test director prepares and processes a change form. The change form becomes an attachment to the official test copy of the procedure. Review and approval requirements for change forms are the same as for the original procedure. Preparation, review, and approval activities are accomplished before or after the performance of associated testing based on one of the following criteria:

a. For minor modifications that obviously preserve the intent of the test, the change is documented within the text of the procedure prior to performance of that part of the test and is reviewed after the performance of associated testing with the test results.

b. For major modifications that alter the intent of the test, the change form is processed before performance of the associated testing.

14.2.4.4 Design Problems

In the process of checkout, preliminary operation, and testing, design problems may be encountered. All such design problems are formally documented and reported to appropriate design organization representatives for resolution. Typical design problems include:

a. Errors or discrepancies in approved project design documents.

b. Items that represent a potential hazard to personnel safety.

c. Proposed facility modifications.

d. Failure of a tested system or component to satisfy design requirements or acceptance criteria.

e. Operating problems where operation is in accordance with approved procedures.

Design response for all such reported items is mandatory. Should the response require a facility modification, the appropriate design documents are revised and issued to the field. Field implementation of the modification is subsequently controlled in accordance with Section 14.2.4.5.

14.2.4.5 Control of Rework, Modifications, and Repairs

A comprehensive listing of outstanding work items is maintained for each system during the initial test program. This listing is maintained to ensure that identified work is performed. Typical listed work items include:

a. Incomplete or incorrect equipment installation

b. Required equipment repairs (corrective maintenance)

c. Approved facility modifications

d. New or additional construction

This work is performed by the construction organization, the plant maintenance staff, or a contract organization in accordance with approved procedures. In any event, in order to maintain the required controls, formal authorization is required to perform the work. This authorization is obtained from the startup group, or from the plant staff through the implementation of appropriate administrative procedures. These administrative procedures, in addition to authorizing performance of the work, specifically identify any retesting required as a result of the work, and document completion of both the work and the retesting. Closure of the associated work list item also requires completion of both the specified work and the specified retesting.

14.2.4.6 Major Test Phase Prerequisites

Completion of each major phase of the initial test program is a prerequisite to starting the succeeding phase. Section 14.2.11 identifies the specific testing scheduled to be conducted during each of the phases. A phase is considered complete only after the results of required testing are evaluated, reviewed, and approved per the requirements of Section 14.2.5.

14.2.5 REVIEW, EVALUATION, AND APPROVAL OF TEST RESULTS

The licensee has overall responsibility for review, evaluation, and approval of test results. The following sections establish the requirements for review, evaluation, and approval of individual test results, major test phase test results, and power ascension test results.

14.2.5.1 Individual Test Results

Upon completion of testing, the test director assembles a test package that includes the official test copy of the procedure and related documentation. Preoperational test packages are submitted to the TRB chairman, who disseminates the information to TRB members responsible for performing an in-depth review and evaluation of test results. Startup test packages are submitted to the PORC chairman, who disseminates the information to PORC members responsible for performing an in-depth review and evaluation of test results.

Test discrepancies, deficiencies, and omissions identified during testing or during review of test results are documented as test exceptions. Test exceptions occurring because of design problems are reported to appropriate design organization representatives for resolution per Section 14.2.4.4. Following review and resolution of review comments, the responsible chairman (TRB or PORC) has three options:

a. Recommend that the entire test be repeated.

b. Recommend that test results are unacceptable until all or part of the outstanding exceptions are resolved.

c. Recommend acceptance of test results with or without exceptions.

Approval of preoperational and startup test results (with or without exceptions) is by the LGS Plant Manager.

14.2.5.2 Test Exceptions

Each exception and its disposition are evaluated and resolved by processing the information through the same review and approval cycle as the original procedure, until such time as the system has been turned over to the plant staff, at which time PORC will perform the review.

14.2.5.3 Major Test Phase - Test Results

Commencement of each major test phase of the startup test program requires that the following test procedure review and approval commitments be satisfied:

a. Commencement of initial fuel loading and zero power testing requires that the results of the preoperational tests of Figure 14.2-6 be reviewed and approved in accordance with Section 14.2.5.1.

b. Commencement of low power testing requires that the results of the initial fuel loading and zero power tests of Figure 14.2-5, be reviewed and approved per the requirements of Section 14.2.5.1.

c. Commencement of power ascension testing requires that the results of the low power tests of Figure 14.2-5 be reviewed and approved per the requirements of Section 14.2.5.1.

14.2.5.4 Power Ascension Testing - Test Results

Figure 14.2-5 prescribes the sequence of testing, during the power ascension testing phase, as a function of reactor power and flow. Commencement of testing specified for each level requires that the test results of the preceding level be reviewed and approved per the requirements of Section 14.2.5.1.

14.2.6 TEST RECORDS

A single copy of each approved procedure, denoted as the official test copy, is used as the official record of the test. The completed official test copy and associated test documents are assembled into a test package at the end of testing. Test packages are retained for the life of the plant, in accordance with licensee procedures for retention of historical records. Each test package contains, either as part of the procedure or as separate documentation, the following information:

a. A description of the test method and objectives

b. A comparison of test data with acceptance criteria

c. Deficiencies relating to design and construction identified during testing

d. Modifications and corrective actions required

e. Justification for acceptance of systems or components not in conformance with design predictions or performance requirements

f. Conclusions regarding system or component adequacy

This test package is intended to serve as the main report for each test because it contains all necessary information concerning the test. Additional individual test reports, summarizing test results, are not contemplated, except as required by plant operation technical specifications.

14.2.7 CONFORMANCE OF TEST PROGRAMS WITH REGULATORY GUIDES

The initial test program to be conducted at LGS is as defined in this chapter. This chapter establishes both the administrative and technical requirements of the test program. Implementation of the initial test program must be in accordance with these requirements.

This program was developed in accordance with the following positions, as related to regulatory guides.

14.2.7.1 General Position - Regulatory Guides

The purpose of the regulatory guides, as related to testing, is to describe the scope and depth (administratively and technically) of an initial test program, acceptable for light-water-cooled nuclear power plants. The basis for the regulatory guides is 10CFR50.34 and 10CFR50, Appendix B. These two items specifically apply to testing structures, systems, and components important to safety; that is, there must be sufficient testing to provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public.

Structures, systems, and components important to safety are classified as safety-related and are identified in Section 3.2. The remaining structures, systems, and components are considered nonsafety-related, and the plant design is based upon the concept that failure of a nonsafety-related structure, system, or component cannot jeopardize the health or safety of the public. The regulatory guides, as related to testing, apply administratively and technically only to structures, systems, and components classified as safety-related; however, to comply with the positions in the guides, systems meeting the criteria of Regulatory Guide 1.68, position C.1, will also be tested.

14.2.7.2 Specific Position - Regulatory Guides

In accordance with the general position of Section 14.2.7.1 plant structures, systems, and components classified as safety-related will be tested in accordance with the testing criteria of the following regulatory guides with specific exceptions, if any, noted below.

Only those portions of the regulatory guides that apply to the initial test program are considered. Other portions of the regulatory guides are implemented as applicable in the plant technical specifications. In addition, testing as specified in these guides is in accordance with existing design.

Regulatory Guide 1.20 (Rev 2) - "Comprehensive Vibration Assessment Program for Reactor Internals During Preoperational and Initial Startup Testing" (May 1976).

Regulatory Guide 1.41 - "Preoperational Testing of Redundant Onsite Electric Power Systems to Verify Proper Load Group Assignments" (March 16, 1973).

Regulatory Guide 1.52 (Rev 2) - "Design, Testing, and Maintenance Criteria for Engineered Safety Feature Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants" (March 1978).

Regulatory Guide 1.56 (Rev 1) - "Maintenance of Water Purity in Boiling Water Reactors" (July 1978).

Regulatory Guide 1.68 (Rev 2) - "Initial Test Programs for Water-Cooled Reactor Power Plants" (August 1978).

The Unit 2 preoperational test program may use some data and test results from testing conducted outside of and prior to the preoperational test. Where this alternate testing is used to satisfy acceptance criteria of the preoperational test, the associated documentation will be reviewed by Quality Assurance and the TRB during the preoperational test results review cycle.

Additionally, for systems or features provided on both Units 1 and 2 to ensure or support the operation of engineered safety features, an alternative to concurrent testing has been developed. These systems can demonstrate support through flow balancing, or for HVAC systems, as discussed below.

Assurance that the safety-related HVAC systems will maintain the safety-related components within their design temperature range, with the components operating in a manner that produces maximum heat load, is provided by the following:

a. The sizing of the safety-related HVAC equipment was based on the maximum heat loads that would occur for DBA conditions.

b. The safety-related fans were performance tested by the vendor to AMCA Standards.

c. The safety-related cooling coils carry coil ratings as follows:

   1. Cooling coils that fall within the parameters of the ARI Certified Rating Program carry an ARI certified performance rating. The ARI ratings are based on qualification test data approved by ARI.

   2. Cooling coils with parameters (entering air temperature, etc) that fall outside the ARI Certified Rating Program are performance rated in accordance with the American Air Filter Company Topical Report AAF-TR-7101, "Design and Testing of Fan Cooler-Filter Systems for Nuclear Applications." This topical report presents the interpolation procedure used to extend the ARI rating technique beyond its approved range. The validity of the procedure has been confirmed by performance tests, and it has been approved by ARI and accepted by the NRC.

d. The balancing of the HVAC systems (air and water sides) will be administered by a startup technical procedure. The monitoring of the HVAC balancing will ensure that the design air and water flows are attained.

e. The Control Enclosure Chilled Water Preoperational Test Procedure IP-30.2 will require verification at the 44^{o}F design chilled water temperature is attained.

The combination of equipment selection of maximum DBA heat loads, equipment performance ratings to accepted standards, air and water balancing along with proper chilled water temperature to satisfy coil performance rating parameters, and air balancing to attain design duct air flow rates is verification that the safety-related HVAC systems will function as designed and will maintain design temperatures as required for DBA conditions.

<u>Regulatory Guide 1.68.1 (Rev 1)</u> - "Preoperational and Initial Startup Testing of Feedwater and Condensate Systems for Boiling Water Reactor Power Plants" (January 1977).

The Unit 2 preoperational test program may use some data and test results from testing conducted outside of and prior to the preoperational test. Where this alternate testing is used to satisfy acceptance criteria of the preoperational test, the associated documentation will be reviewed by Quality Assurance and the TRB during the preoperational test results review cycle.

<u>Regulatory Guide 1.68.2</u> - "Initial Startup Test Program to Demonstrate Remote Shutdown Capability for Water-Cooled Nuclear Power Plants" (January 1977).

<u>Regulatory Guide 1.68.3</u> - "Preoperational Testing of Instrument and Control Air Systems" (April 1982).

Compliance is demonstrated by preoperational test procedures P-18.1, P-25.1, P-83.1, and P-100.2.

The Unit 2 preoperational test program may use some data and test results from testing conducted outside of and prior to the preoperational test. Where this alternate testing is used to satisfy acceptance criteria of the preoperational test, the associate documentation will be reviewed by Quality Assurance and the TRB during the preoperational test results review cycle.

Regulatory Guide 1.70 (Rev 3) - "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants" (November 1978).

Regulatory Guide 1.104 - "Overhead Crane Handling Systems for Nuclear Power Plants" (February 1976).

Overhead crane testing exceptions are as outlined in Section 9.1.5.

Regulatory Guide 1.108 (Rev 1) - "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants" (August 1977).

Testing of the diesel generators is discussed in Section 8.1.6.1.20.

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

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

The TRB and the PORC are responsible for ensuring that reactor operating and testing experiences of similar power plants are utilized during the initial test program. The primary sources of experience feedback is the Independent Safety Engineering Group and the Operating Experience Assessment Committee who provide relevant information based upon their continuing review of the industry via such sources as INPO Significant Operating Experience

Reports and Significant Event Reports, GE Service Information Letters, and NRC Licensee Event Reports. This review includes at least a two year period prior to the commencement of the initial test program. The TRB chairman and the PORC chairman are each responsible for disseminating this feedback material to individuals who are designated test procedure review responsibility. During their review of assigned test procedures, TRB and PORC members are subsequently responsible for ensuring that pertinent feedback experiences are considered.

14.2.9 TRIAL USE OF PLANT OPERATING AND EMERGENCY PROCEDURES

The preparation, review, and approval of plant operating and emergency procedures are described in Chapter 13. Sufficient time is provided for confirming procedure adequacy by trial use during the initial test program. Those procedures that do not require nuclear fuel are confirmed as adequate during the preoperational test program. Those procedures that require nuclear fuel are confirmed as adequate during the startup test program.

The plant operating staff is responsible for confirming operating and emergency procedures. The LGS Plant Manager is responsible for ensuring that comments and/or changes identified during confirmation are incorporated into finalized procedures.

It is not intended that preoperational and startup test procedures explicitly incorporate or reference plant operating and emergency procedures, although they may do so where appropriate. These tests are intended to stand on their own, since they are not necessarily compatible with configurations and conditions required for confirmation of facility operating and emergency procedures.

14.2.10 INITIAL FUEL LOADING AND INITIAL CRITICALITY

Initial fuel loading is accomplished in accordance with startup test procedure, "Fuel Loading, STP-3." Initial criticality is accomplished in accordance with startup test procedure, "Full Core Shutdown Margin, STP-4." These procedures comply with the general guidelines and regulatory positions contained in Regulatory Guide 1.68 (Rev 2 - August 1978). Test abstracts establishing the objectives, prerequisites, test method, and acceptance criteria for these procedures are presented in Table 14.2-3.

14.2.11 TEST PROGRAM SCHEDULE

The schedule, relative to the initial fuel loading date, for conducting each major test phase of the initial test program is presented in Figure 14.2-1. This figure illustrates that the preoperational test program is scheduled for 15 months duration for Unit 1, 16 months duration for Unit 2, and that the subsequent startup test programs are scheduled at 3 months and 6 months duration for Units 1 and 2, respectively. Approved preoperational test procedures are intended to be available for NRC review at least 60 days prior to scheduled implementation. Copies of approved test procedures for fuel loading, initial startup testing (zero power testing), and supporting activities through Phase II of the initial test program are intended to be available for NRC examination not less than 60 days before the scheduled fuel load date. Copies of test procedures for Phase III (Low Power Testing) and Phase IV (Power Ascension Testing) of the initial test program are intended to be available for NRC examination not less than 60 days prior to the scheduled fuel load date. Every effort will be made to provide approved test procedures for Phases III and IV; however, if such procedures are not available, copies of draft procedures will be provided.

The sequential schedules for conducting individual preoperational tests for each unit are presented in Figures 14.2-6 and Figure 14.2-7. These sequential schedules offer one possible plan for an orderly and efficient progression of testing. While these sequences may be preferred, numerous acceptable alternatives exist because few preoperational tests are dependent on performance of other preoperational tests. The actual test sequences are determined daily at the job-site to reflect construction status, manpower availability, and test prerequisite status.

The sequential schedule for conducting Unit 1 and Unit 2 startup tests is presented in Figure 14.2-5. This schedule establishes the required order of startup testing as a function of test phase and power level. Even though this basic order of testing is required, there is still considerable flexibility in sequencing the startup testing specified to be conducted at each test phase or startup level. Detailed startup testing schedules, commensurate with the requirements of this schedule, are developed at the job-site to schedule startup testing when operationally expedient.

14.2.12 INDIVIDUAL TEST DESCRIPTIONS

Individual abstracts for each preoperational test conducted during the preoperational test program are given in Table 14.2-4. Individual abstracts for each startup test conducted during the subsequent startup test program are given in Table 14.2-3. These abstracts identify each test by title and number, describe the test objectives, identify the test prerequisites, provide a summary description of the test method, and establish basic test acceptance criteria. Presently known documents that provide sources of acceptance criteria are identified in parentheses in the acceptance criteria section of the individual abstracts. Other documents or FSAR sections referenced within the identified document may also serve as sources of acceptance criteria. The test abstracts are not intended to be ongoing documents that are continuously changed as references are modified. The identification of documents may be modified as specific acceptance criteria are developed and test procedures are written.

Table 14.2-1

PREOPERATIONAL TEST PROCEDURES

TEST NUMBER	TEST TITLE
P-2.1	125 V (Div III, IV) Dc Safeguard Power System
P-2.2	125/250 V (Div I, II) Dc Safeguard Power System
P-3.1	13.2 kV Unit Auxiliary Power System
P-4.1	4 kV Safeguard Power System
P-5.1	Safeguard 440 V Load Centers
P-6.1	Safeguard 440 V Motor Control Centers
P-7.1	Standby Dc Lighting System
P-11.1	Service Water System
P-13.1	Fire Protection Water Systems
P-13.2	Fire Protection CO_2 System
P-13.3	Fire Protection Air Foam System
P-13.4	Smoke Detection System
P-13.5	Fire Protection Halon System
P-14.1	Reactor Enclosure Cooling Water System
P-15.1	Turbine Enclosure Cooling Water System
P-16.1	Residual Heat Removal Service Water System
P-17.1	Instrumentation Ac Power System
P-18.1	Instrument Air System
P-23.1	Diesel Generator Fuel Oil System
P-24.1	Standby Diesel Generator System
P-25.1	Primary Containment Instrument Gas System
P-28.1	Diesel Generator Enclosure HVAC System
P-28.2(1)	Spray Pond Pump Structure HVAC System

Table 14.2-1 (Cont'd)

TEST NUMBER	TEST TITLE
P-30.1[(1)]	Control Enclosure HVAC System
P-30.2[(1)]	Control Enclosure Chilled Water System
P-32.1[(1)]	Control Room HVAC System
P-32.2[(1)]	Control Room Isolation and Purge System
P-33.1	Turbine Enclosure HVAC System
P-34.1	Reactor Enclosure HVAC System
P-34.2	Refueling Area HVAC System
P-35.1	Fuel Pool Cooling and Cleanup System
P-37.1	Condensate and Refueling Water Transfer System
P-39.1	Condensate Demineralizer System
P-41.1	Cooling Tower System
P-42.1	Circulating Water System
P-43.1	Condenser and Air Removal System
P-44.1	Condensate System
P-45.1	Feedwater System
P-46.1	Extraction Steam and Feedwater Heater Systems
P-49.1	Residual Heat Removal System
P-50.1	Reactor Core Isolation Cooling System
P-51.1	Core Spray System
P-52.1	High Pressure Coolant Injection System
P-53.1	Standby Liquid Control System
P-54.1	Emergency Service Water System
P-55.1	Control Rod Drive Hydraulic System
P-56.1	Reactor Manual Control System

Table 14.2-1 (Cont'd)

TEST NUMBER	TEST TITLE
P-57.1	Uninterruptible Ac Power System
P-58.1	Reactor Protection System
P-58.2	Redundant Reactivity Control System for ATWS
P-59.1	Containment Isolation and Nuclear Steam Supply Shutoff System
P-59.2	Primary Containment Integrated Leak Rate Test
P-59.3	Suppression Pool, Pool Cleanup, and Vacuum Relief
P-60.1	Drywell HVAC System
P-61.1	Reactor Water Cleanup System
P-62.1	Reactor Vessel and Auxiliaries
P-64.1	Reactor Recirculation System
P-65.1(1)	Radwaste Enclosure HVAC System
P-66.1	Reactor Enclosure Unit Cooler System
P-66.2(1)	Control Enclosure Unit Coolers
P-68.1	Solid Radwaste System
P-69.1	Equipment Drain Collection and Storage System
P-69.3	Liquid Radwaste System
P-70.1(1)	Standby Gas Treatment System and Reactor Enclosure Air Recirculation, Secondary Containment Isolation
P-72.1	Gaseous Radwaste Recombiners and Filters
P-73.1	Containment Atmosphere Control System
P-76.1	Process Sampling System
P-76.2	Postaccident Sampling System
P-78.1	Startup Range Detector Drive Control and Neutron Monitoring System

Table 14.2-1 (Cont'd)

TEST NUMBER	TEST TITLE
P-78.2	Power Range Neutron Monitoring System
P-78.3	Traversing Incore Probes Calibration System
P-79.1	Area Radiation Monitoring System
P-79.2	Process Radiation Monitoring System
P-80.1	Reactor Vessel Instrumentation System
P-81.1	Fuel Handling System
P-83.1	Main Steam System
P-83.2	Automatic Depressurization System
P-83.3	Steam Leak Detection System
P-85.1	Cathodic Protection System
P-85.2	Freeze Protection and Heat Trace Systems
P-91.1	Plant Annunciator Systems
P-93.2	Main Turbine Control System
P-93.3	Main Turbine Supervisory System
P-99.1	Reactor Enclosure Crane
P-99.2	Seismographical Monitoring System
P-99.3	Public Address and Evacuation System
P-100.1	Loss of Offsite Power Test
P-100.2	Loss of Instrument Air
P-100.3	Mechanical Snubber Testing (Replaced by TT1.30)
P-100.4	Standby Diesel Generator Loading

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(1) Common System - All common testing to be performed during Unit 1 initial test program only.

Table 14.2-2

STARTUP TEST PROCEDURES

TEST NUMBER	TEST TITLE
STP-1	Chemical and Radiochemical (Formerly SUT-1)
STP-2	Radiation Measurements (Formerly SUT-2)
STP-3	Fuel Loading (Formerly SUT-3)
STP-4	Full Core Shutdown Margin (Formerly SUT-4)
STP-5	Control Rod Drive System (Formerly SUT-5)
STP-6	Source Range Monitor Performance and Control Rod Sequence (Formerly SUT-6)
STP-9	Water Level Reference Leg Temperature (Formerly SUT-7)
STP-10	Intermediate Range Monitor Performance (Formerly SUT-8)
STP-11	Local Power Range Monitoring Calibration (Formerly SUT-9)
STP-12	Average Power Range Monitoring Calibration (Formerly SUT-10)
STP-13	Process Computer Performance Verification (Unit 1) (Formerly SUT-11)
STP-13	Plant Monitoring System Performance Verification (Unit 2)
STP-14	RCIC System Performance Verification (Formerly SUT-12)
STP-14.1	RCIC System Startup After Loss of Ac Power to the System (Formerly SUT-12.1)
STP-14.2	RCIC System Operation with a Sustained Loss of Ac Power to the System (Formerly SUT-12.2)
STP-15	HPCI System Performance Verification (Formerly SUT-13)
STP-16	Selected Process Temperatures Verification (Formerly SUT-14)
STP-17	System Expansion (Formerly SUT-15)

Table 14.2-2 (Cont'd)

TEST NUMBER	TEST TITLE
STP-18	TIP Uncertainty (Formerly SUT-16)
STP-19	Core Performance (Formerly SUT-17)
STP-20	Steam Production
STP-21	DELETED
STP-22	Pressure Regulator Response (Formerly SUT-19)
STP-23	Feedwater Control System Demonstration (Formerly SUT-20)
STP-24	Main Turbine Valves Surveillance Test (Formerly SUT-23)
STP-25	Main Steam Isolation Valves Performance Verification (Formerly SUT-21)
STP-26	Main Steam Relief Valves Performance (Formerly SUT-22)
STP-27	Turbine Trip and Generator Load Rejection Demonstration (Formerly SUT-25)
STP-28	Shutdown from Outside the Main Control Room Demonstration (Formerly SUT-24)
STP-29	Recirculation Flow Control Demonstration (Formerly SUT-26)
STP-30	Recirculation System (Formerly SUT-27)
STP-31	Loss of Turbine-Generator and Offsite Power (Formerly SUT-28)
STP-32	Essential HVAC System Operation and Containment Hot Penetration Temperature Verification (Formerly SUT-34)
STP-33	Piping Steady-State Vibration Measurements (Formerly SUT-29)
STP-34	Offgas System Performance Verification (Formerly SUT-33)

Table 14.2-2 (Cont'd)

TEST NUMBER	TEST TITLE
STP-35	Recirculation Flow Calibration (Formerly SUT-30)
STP-36	Piping Dynamic Transient (Formerly SUT-36)
STP-37	DELETED
STP-38	DELETED
STP-70	Reactor Water Cleanup System Performance Verification (Formerly SUT-31)
STP-71	Residual Heat Removal System Performance Verification (Formerly SUT-32)

Table 14.2-3

STARTUP TEST PROCEDURE ABSTRACTS

(STP-1) Chemical and Radiochemical

Test Objectives - The test objectives are to ensure that the systems provide adequate means to maintain control and knowledge of the quality of the plant systems chemistry and to ensure that the sampling equipment, procedures, and analytic techniques are adequate to supply the data required to demonstrate that the fluids meet quality specifications and process requirements. They must also monitor the integrity of the fuel, the operation of the demineralizers and filters, the condenser tube integrity, the operation of the offgas system, and the tuning of certain process instruments.

Prerequisites - Instrument calibration and preoperational testing of chemical, radiation, and radiochemical monitors are completed, and a set of chemical and radiochemical samples were taken to functionally check sample stations.

Test Method - Prior to fuel loading, a set of chemical and radiochemical samples is taken to determine initial concentrations for selected systems. Subsequent to fuel loading, during reactor heatup, and at each major power level change, samples are taken and measurements are made to determine the chemical and radiochemical quality of reactor water and reactor feedwater, the amount of radiolytic gas in the steam, gaseous activities after the air ejectors, decay times in the offgas lines, and the performance of filters and demineralizers. Monitors in the liquid waste system and liquid process lines are adjusted as required. The chemical and radiochemical monitors and the sample system operation verify that the system is capable of providing true samples at proper flow, temperature, and/or moisture content, as applicable, so that means are available for the reliable analysis of the process by instrumentation or plant personnel.

Acceptance Criteria - Water quality remains within applicable guidelines, and gaseous and liquid effluent activities conform with plant requirements.

(STP-2) Radiation Measurements

Test Objectives - The test objectives are: to determine the background gamma and neutron radiation levels in the plant environs prior to operation in order to provide base data on activity buildup and shielding adequacy; and to monitor radiation at selected power levels to ensure the protection of personnel, and continuous compliance with the guideline standards of 10CFR20 during plant operation.

Prerequisites - A survey of natural background radiation is made at selected locations throughout the plant site.

Test Method - Subsequent to fuel loading, during reactor heatup, and at various selected power levels, gamma radiation level measurements and, where appropriate, neutron dose rate measurements are made at significant locations throughout the plant site. Potentially high radiation areas are surveyed.

Acceptance Criteria - Plant radiation doses and personnel occupancy times are controlled within allowable limits as defined in 10CFR20.

Table 14.2-3 (Cont'd)

(STP-3) Fuel Loading

Test Objective - The test objective is to load fuel safely and efficiently to the full core size.

Prerequisites - The preoperational test program test results have been reviewed and approved, and an NRC license has been issued to PECo. A neutron source is installed near the center of the core. At least three neutron detectors, calibrated and connected in a noncoincident mode to high flux scram trips, are located to produce acceptable signals during loading. Final testing of this reactor protection system and final reactor coolant leak rate testing have been completed.

Test Method - The fuel loading procedure includes the loading sequence, pattern, and records for logging, a running inventory of fuel status, control rod checks, minimum shutdown checks, neutron monitoring, subcritical multiplication behavior, communication requirements, safety requirements, emergency procedures, and additional checks to be performed during fuel loading.

For Unit 1, fuel loading begins at the center of the core and proceeds radially to the fully loaded configuration. During the loading of each cell, two fuel assemblies will be loaded in the location not occupied by the blade guide. The blade guide will be removed, and loading of the cell will be completed. A functional check to verify the operability of the control rod and drive will be performed on each cell after the cell is loaded.

This functional check may also serve as a subcritical check to verify that the next cell may be safely loaded.

For Unit 2, fuel loading will begin off-center so that loading can begin between an SRM and the closest source, and will continue in a spiral pattern to the full loaded configuration. During the loading of each cell, two fuel assemblies will be loaded in the location not occupied by the blade guide. The blade guide will be removed, and loading of the cell will be completed. A functional check to verify the operability of the control rod and drive will be performed on each cell after the cell is loaded. This functional check may also serve as a subcritical check to verify that the next cell may be safely loaded. Subcritical checks are not required for the first 16 fuel bundles loaded since an analysis has been performed which indicates that the first 16 fuel bundles loaded cannot establish a critical geometry.

Acceptance Criteria - The core is fully loaded in accordance with established procedures, and the core is subcritical.

(STP-4) Full Core Shutdown Margin

Test Objective - The test objective is to demonstrate that the reactor is sufficiently subcritical throughout the first fuel cycle, with any single control rod fully withdrawn.

Prerequisites - The core is fully loaded; the subcritical checks are completed; and the SRMs and IRMs are installed in the vessel and connected in a noncoincident mode, to scram at a high neutron level. The rod worth minimizer system is operational.

Table 14.2-3 (Cont'd)

Test Method - The shutdown margin test is performed by fully withdrawing a series of previously selected rods until criticality is reached. The empirical data are analyzed and compared with calculated data to determine the test results.

Acceptance Criteria - The basic criterion for reactivity control is that the core, in its maximum reactivity state at any time in the cycle, be sufficiently subcritical, with the strongest rod withdrawn, and all other rods fully inserted. Satisfactory completion of the shutdown margin test ensures, at the time of fuel loading, that this criterion has been met.

(STP-5) Control Rod Drive System

Test Objectives - The test objectives are to demonstrate that the CRD system operates over the full range of primary coolant temperatures and pressures, from ambient to operating, and to determine the initial operating characteristics of the entire CRD system.

Prerequisites - The process computer, scram time recorder, or equivalent recording equipment is on-line and available to monitor events; the CRD electrical and hydraulic system preoperational testing is completed satisfactorily; and the vessel water level is always above the upper core grid during all CRD movements. The reactor protection system preoperational test is completed, and the scram pilot valves are ready for energization.

Test Method - For Unit 1, during fuel load, a visual check is made of the position indication of each control rod, and the four-rod displays are checked for missing numbers. Insert and withdrawal times are verified during fuel load, and again at rated pressure for selected rods. Scram testing will be performed following fuel loading and at rated pressure. Coupling checks are again verified by the operator. Friction testing is conducted by measuring the pressure differential between the insert and withdrawal lines during the continuous insertion of a control rod.

For Unit 2, during fuel load, a visual check is made of the position indication of each control rod, and the four-rod displays are checked for missing numbers. Insert and withdrawal times are verified during fuel load, and again at rated pressure for selected rods. Scram testing will be performed following fuel loading and at rated pressure. Coupling checks are again verified by the operator. Friction testing is conducted by measuring the pressure differential between the insert and withdrawal lines or between the drive water header pressure downstream of the CRD Friction Testing Station and reactor pressure during the continuous insertion of a control rod.

Acceptance Criteria - Scram times and friction test results fall within acceptance limits. Each CRD has normal insert and withdrawal times within the limits indicated.

(STP-6) SRM Performance and Control Rod Sequence

Test Objective - The test objective is to demonstrate that the sources and SRM system provide sufficient information for knowledgeable and controlled reactor startup at low neutron levels.

Prerequisites - Fuel loading is completed, neutron sources are in place, and the core is clean and cold with all control rods inserted.

Table 14.2-3 (Cont'd)

Test Method - All control rod movement or operation is in compliance with approved owner operating procedures. The SRMs are connected, and subcritical testing verifies SRM response to control rod withdrawal. With the SRMs operational, criticality is approached. Records are maintained of count rate, rod configuration, and times. Criticality is achieved by withdrawing rods in the designated sequence.

Acceptance Criteria - SRMs are operational and read on-scale within the designed range for a cold clean core.

(STP-9) Water Level Reference Leg Temperature

Test Objective - The test objective is to demonstrate the calibration and agreement of the installed reactor vessel water level instrumentation at normal operating pressure and temperature.

Prerequisites - The following are determined and recorded: elevations of instrument taps, condensing chambers, head chambers indicating zero water level, and instrument ranges. The reactor is in a steady-state condition during each stage of testing. Air temperature in the vicinity of the level columns is stabilized.

Test Method - The test will be done at rated temperature and pressure and under steady-state conditions; the reference leg temperature will be measured and compared to the value assumed during initial calibration. If the difference exceeds operating tolerances, the instruments will be recalibrated using the measured value.

Acceptance Criteria - The installed reactor water level indication and controls provide accurate information and sufficient operating tolerances under normal operating conditions.

(STP-10) IRM Performance

Test Objective - The test objective is to demonstrate IRM system response to neutron flux and IRM overlap with the SRM and APRM systems.

Prerequisites - Fuel loading is completed, and the reactor is just critical. IRM gains are set at maximum for conservatism on Unit 1. IRM gains are set conservatively on Unit 2.

Test Method - After criticality and when flux level is sufficient, IRM response to neutron flux and the IRM/SRM overlap is verified. The SRMs and IRMs may then be taken out of noncoincident scram. Following APRM calibration in accordance with another procedure, the IRM gains may be adjusted to optimize the IRM overlap with the SRMs and APRMs.

Acceptance Criteria - Resulting IRM overlap with the SRMs and APRMs is established within acceptable limits.

(STP-11) Local Power Range Monitoring Calibration

Test Objective - The test objective is to calibrate the LPRM system.

Prerequisites - Reactor power and LPRM gains are sufficient to observe chamber response to the adjacent control rod during calibration of any LPRMs. The ability of the APRM system to provide

Table 14.2-3 (Cont'd)

input to the reactor protection system is maintained during this test. The process computer or off-line computer is available.

Test Method - The core is operated in a specified test condition, for a period sufficient to obtain short-term equilibrium conditions. LPRMs are calibrated in accordance with the calibration procedure. The meter reading of each LPRM chamber is proportional to the average heat flux in the four adjacent fuel rods at the height of the chamber.

Acceptance Criteria - LPRM calibration, in accordance with the procedure, is satisfactorily completed.

(STP-12) APRM Calibration

Test Objective - The test objective is to calibrate the APRM system.

Prerequisites - The core is at steady-state condition at the desired power level and core flow rate. Control rod positions and core flow are not changed during the time data are taken for these calibrations.

Test Method - With the core in a steady-state condition, calculations are made of the percent of rated power by heat balance. The APRMs are calibrated to agree with the calculated power value.

Acceptance Criteria - The APRMs are calibrated to read equal to or greater than the calculated core thermal power.

(STP-13) Process Computer Performance Verification (Unit 1)

Test Objective - The test objective is to demonstrate the ability of the process computer to provide accurate information pertaining to plant process variables under operating conditions.

Prerequisites - Fuel loading is completed to the extent necessary to perform this test. Applicable field inputs are terminated, computer room HVAC is operational, and the computer is operational, with plant data available.

Test Method - Following fuel loading, and during plant heatup and ascension to rated power, plant process variables, sensed by the computer as digital or analog signals, are recorded. Performance calculation programs are run, and the results recorded.

Acceptance Criteria - Programs P-1, OD-1, and OD-6 are considered operational when:

a. The MFLCPR, calculated by an independent method, and calculated by process computer, either:

    1. Are in the same fuel assembly and do not differ in value by more than 2%.

    2. When the MFLCPR calculated by the process computer is in a different assembly than that calculated by the independent method, the MFLCPR calculated by the two methods agree within 2%, for each assembly.

Table 14.2-3 (Cont'd)

b. The MFLPD, calculated by the independent method, and by the proces computer, either:

   1. Are in the same fuel assembly and do not differ in value by more than 2%.

   2. When the MFLPD calculated by the process computer is in a different assembly than that calculated by the independent method, the MFLPD calculated by the two methods agree within 2%, for each assembly.

c. The MAPLHGR, calculated by the independent method, and the process computer, either:

   1. Are in the same fuel assembly and do not differ in value more than 2%.

   2. When the MAPLHGR calculated by the process computer is in a different assembly than that calculated by the independent method, the MAPLHGR calculated by the two methods agree within 2%, for each assembly.

d. The LPRM calibration factors calculated by the independent method and the process computer agree to within 2%.

e. The remaining programs are considered operational upon successful completion of the static and dynamic testing.

(STP-13) Plant Monitoring System Performance Verification (Unit 2)

Test Objective - The test objective is to demonstrate the ability the PMS to provide accurate information pertaining to plant process variables under operating conditions.

Prerequisites - Fuel loading is completed to the extent necessary to perform this test. Applicable field inputs are terminated, computer room HVAC is operational, and the computer is operational, with plant data available.

Test Method - Following fuel loading, and during plant heatup and ascension to rated power, plant process variables, sensed by the computer as digital or analog signals, are recorded. Performance calculation programs are run, and the results recorded.

Acceptance Criteria - Programs P-1, OD-1, and OD-6 are considered operational when:

a. The MFLCPR, calculated by an independent method, and calculated by the PMS, either:

   1. Are in the same fuel assembly and do not differ in value by more than 2%.

   2. When the MFLCPR calculated by the PMS is in a different assembly than that calculated by the independent method, the MFLCPR calculated by the two methods agree within 2%, for each assembly.

Table 14.2-3 (Cont'd)

b. The MFLPD, calculated by the independent method, and by the PMS, either:

   1. Are in the same fuel assembly and do not differ in value by more than 2%.

   2. When the MFLPD calculated by the PMS is in a different assembly than that calculated by the independent method, the MFLPD calculated by the two methods agree within 2%, for each assembly.

c. The MAPLHGR, calculated by the independent method, and the PMS, either:

   1. Are in the same fuel assembly and do not differ in value more than 2%.

   2. When the MAPLHGR calculated by the PMS is in a different assembly than that calculated by the independent method, the MAPLHGR calculated by the two methods agree within 2%, for each assembly.

d. The LPRM calibration factors calculated by the independent method and the PMS agree to within 2%.

e. The remaining programs are considered operational upon successful completion of the static and dynamic testing.

(STP-14) Reactor Core Isolation Cooling System Performance Verification

Test Objective - The test objective is to demonstrate operation of the RCIC system over its required operating pressure range.

Prerequisites - The preoperational test of the RCIC system is completed. Fuel loading is completed, and sufficient nuclear steam is available to operate the RCIC pump throughout its operating range.

Test Method - A controlled start of the RCIC system is done at a reactor pressure of nominal 150 psig, and an automatic actuation start is done at rated reactor pressure. Verify the proper operation of the RCIC system and determine the time to reach rated flow. These tests may first be performed with the system in the test mode, so that discharge flow is not routed to the reactor pressure vessel. The final demonstration is made so that discharge flow is routed to the reactor pressure vessel while the reactor is at partial power. A cold quick start is performed with the system on the full flow test loop.

Acceptance Criteria - The RCIC system must have the capability to deliver specified flow, in less than or equal to the rated actuation time, against nominal rated reactor pressure.

Table 14.2-3 (Cont'd)

(STP-14.1) RCIC System Startup After Loss of Ac Power to the System

Test Objective - The test objective is to demonstrate the ability of the system to start without the aid of ac power with the exception of the RCIC dc/ac inverters.

Prerequisites - The preoperational test of the RCIC system is completed. Fuel loading is completed, and sufficient nuclear steam is available to operate the RCIC pump throughout its operating range. Power to RCIC components fed by site ac power is secured, and the station batteries are fully charged.

Test Method - A manual initiation of the RCIC system is accomplished at rated reactor pressure to verify the proper operation of all components to reach rated flow.

Acceptance Criteria - The RCIC system must have the capability to deliver specified flow against nominal rated reactor pressure without the normal ac site power supply.

(STP-14.2) RCIC System Operation with a Sustained Loss of Ac Power to the System

Test Objective - The test objective is to verify the operation of the RCIC beyond its design basis to evaluate the limits of the system operation with extended loss of ac power to the RCIC system and support systems with the exception of the RCIC dc/ac inverters.

Prerequisites - The preoperational test of the RCIC system is completed. Fuel loading is completed, and sufficient nuclear steam is available to operate the RCIC pump throughout its operating range. The RCIC system valves are in a normal standby lineup with suction from the CST. Power to RCIC components fed by site ac power is secured including the RCIC area coolers and battery chargers supplying the station battery from which the RCIC dc loads are powered. The RCIC batteries are fully charged. Instrument air is available for operation and controls of the appropriate valves.

Test Method - Start and operate the RCIC system with return to the CST and run the system for two hours or until any system limiting parameter is approached (e.g.: high RCIC area temperature, low battery voltage or high suppression pool temperature).

Acceptance Criteria - No defined acceptance criteria. The purpose of the test is to verify the operation of RCIC beyond its design basis.

(STP-15) High Pressure Coolant Injection System Performance Verification

Test Objective - The test objective is to demonstrate proper operation of the HPCI system over its required operating pressure range.

Prerequisites - The preoperational test of the HPCI system is completed. Fuel loading is completed, and sufficient nuclear steam is available to operate the HPCI pump throughout its operating range.

Table 14.2-3 (Cont'd)

Test Method - Controlled starts of the HPCI system are done at reactor pressures near 150 and rated during the heatup phase, and an automatic start is initiated. Verify the proper operation of the HPCI System, determine the time to reach rated flow, and adjust the flow controller in the HPCI System for proper flow rate. These tests are performed with the system in the test mode, so that discharge flow is not routed to the reactor pressure vessel. The final demonstration is made so that discharge flow is routed to the reactor pressure vessel, while the reactor is at partial power.

Acceptance Criteria - The HPCI turbine must not trip off during startup. The HPCI system must have the capability to deliver specified flow, in less than or equal to rated actuation time, against nominal rated reactor pressure.

(STP-16) Selected Process Temperatures Verification (Unit 1)

Test Objectives - The test objectives are: to establish the proper setting for the low speed limiter for the recirculation pumps, to keep the bottom head water temperature from being too low; and to demonstrate that the bottom head drain temperature corresponds to bottom head coolant temperature, during normal operation.

Prerequisites - The reactor is in a low power condition.

Test Method - With recirculation pumps at approximately 28% of maximum speed, allow the reactor to attain a steady-state condition. Data are recorded; then the speed of the pumps is slowly lowered until 20% of maximum speed or the minimum stable speed is reached, whichever is greater. Data are again recorded. The empirical data are analyzed to determine the optimum low speed limiter setting.

Acceptance Criteria - The resultant low speed setting maintains upper and lower region coolant temperatures within the specified limits.

(STP-16) Selected Process Temperatures Verification (Unit 2)

Test Objectives - The test objective is: to demonstrate that the bottom head drain temperature corresponds to bottom head coolant temperature, during normal operation.

Prerequisites - The reactor core flow is ≥95% of rated.

Test Method - With core flow at ≥95% of rated compare bottom drain line temperature with recirculation loop coolant temperature.

Acceptance Criteria - The bottom head drain temperature corresponds to the bottom head coolant temperature within specified limits.

(STP-17) System Expansion

Test Objectives - The test objectives are: to demonstrate that major equipment and the piping systems throughout the plant are free and unrestrained, with regard to thermal expansion; and that suspension components are functioning in the specified manner. See Section 3.9.2.1a.2 for nuclear steam supply system (NSSS) piping, and Table 3.9-7 for non-NSSS piping.

Table 14.2-3 (Cont'd)

The test also provides data for calculating stress levels in various critical nozzles and weldments.

Prerequisites - Engineering review of the piping systems is completed. Fuel loading and preservice examination of snubbers is completed and cold plant data are recorded. Preservice examination will include the following (Section 3.9.3.5.2.4):

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

b. Location, orientation, position setting, and configuration are according to design drawings and specifications.

c. Snubbers are not seized, frozen, or jammed.

d. Adequate swing clearance is provided to allow snubber movement.

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

When the interval between performance of snubber preservice inspection and initial power operation exceeds 6 months, items (a) and (d) above shall be reperformed and documented.

Test Method - During equipment heatup, observations and/or recordings of the horizontal and vertical movements of major equipment and piping in the NSSS and BOP systems are made to ensure that components are free to move as designed. Adjustments are made as necessary for freedom of movement.

Acceptance Criteria - There is no evidence of blocking the displacement of any system component caused by thermal expansion of the system.

Inspected hangers are not bottomed out or fully extended.

The shock suppressor positions allow movement at operating temperature with adequate swing clearance.

All measured displacements of the piping are within the specified acceptable range.

(STP-18) TIP Uncertainty

Test Objectives - The test objectives are: to demonstrate the reproducibility of the TIP system readings.

Prerequisites - The core is at steady-state power level with equilibrium xenon. It remains in this condition with no control rod motion or change in core flow until completion of the TIP traces.

Test Method - The rod pattern and all APRM system and LPRM system readings are recorded. TIP reproducibility is checked with the plant at steady-state condition by producing several TIP traces in the same location, with each TIP machine. The traces are evaluated to determine the extent of deviations between traces from the same TIP machine.

Table 14.2-3 (Cont'd)

Acceptance Criteria - The TIP system error level is within the specified limits.

(STP-19) Core Performance

Test Objective - The test objective is to evaluate the principal thermal and hydraulic parameters associated with core behavior.

Prerequisites - The plant is operating in an essentially steady-state condition.

Test Method - With the core operating in a steady-state condition, the core performance evaluation is used to determine the principal thermal and hydraulic parameters associated with core behavior. These parameters are: core flow rate, core thermal power level, MAPLHGR, MLHGR, core MCPR, and MFLPD.

Acceptance Criteria - The principal thermal and hydraulic parameters associated with core behavior meet appropriately calculated limits (Vendor Test Specifications and plant Technical Specifications).

(STP-20) Steam Production

Test Objective - The objective of this test is to demonstrate that the NSSS is providing steam sufficient to satisfy all appropriate warranties.

Prerequisites - Required preoperational tests have been completed. All required instrumentation is installed and calibrated.

Test method - A NSSS steam output performance test of nominal 100 hours of continuous operation at the warranted steam output will be performed.

Acceptance Criteria - The NSSS shall be capable of supplying steam sufficient to satisfy all appropriate warranties.

(STP-21) DELETED

(STP-22) Pressure Regulator Response

Test Objectives - The test objectives are: to demonstrate the reactor pressure control system responses to pressure regulator setpoint changes, the stability of the reactivity void feedback loop to pressure perturbation, the control characteristics of the bypass and control valves, and the takeover capabilities of the backup pressure regulator; and to optimize the pressure regulator settings to give the best combination of fast response and small overshoot.

Prerequisites - Fuel loading is completed and nuclear steam is available.

Table 14.2-3 (Cont'd)

Test Method - The pressure setpoint is decreased rapidly and then increased rapidly by about 10 psi. The response of the system is measured in each case. The backup regulator is tested by

increasing the operating pressure regulator setpoint rapidly, until the backup regulator takes over control. The load reference setpoint is reduced, and the test is repeated with the bypass valve having control. The response of the system is measured and evaluated, and the regulator settings are optimized.

Acceptance Criteria - The decay ratio is acceptable for each process variable that exhibits oscillatory response to pressure regulator changes.

During the simulated failure of the primary controlling pressure regulator, the backup regulator is expected to control the transient so that the reactor does not scram.

Steady-state hunting or limit cycle characteristics due to control and valve dead band are acceptable at rated steam flow.

(STP-23) Feedwater Control System Demonstration

Test Objectives - The test objectives are: to evaluate and adjust feedwater controls; to demonstrate the capability of the automatic flow runback feature to prevent a low water level scram, following the trip of one feedwater pump; to demonstrate acceptable performance of feedwater pumps and turbine drivers within specifications; to demonstrate adequate response to feedwater heater loss (inlet subcooling change); and to demonstrate acceptable reactor water level control.

Prerequisites - The reactor is operating at a steady-state condition.

Test Method - At power levels of approximately 25%, 50%, 75%, and 100%, the reactor water level setpoint is changed approximately ±6 inches, to evaluate acceptability of the feedwater control systems at all modes of operation.

One of the three operating feedwater pumps is tripped at a power level such that the automatic flow runback circuit acts to drop power to within the capability of the remaining pumps.

The resulting transients from the loss of feedwater heating are evaluated at nominal 90% power.

Feedwater pumps and turbine driver variables are monitored throughout power ascension testing to demonstrate operability within specified limits.

Acceptance Criteria - The decay ratio is acceptable for each process variable that exhibits oscillatory response to feedwater control system setpoint changes, when the plant is operating above the lower limit of the master flow controller. The system has the capacity for automatic flow runback to prevent a low water level scram following the trip of one feedwater pump. The feedwater pumps and turbine drivers perform within specified limits (Vendor Test Specification).

Table 14.2-3 (Cont'd)

(STP-24) Main Turbine Valves Surveillance Test

Test Objective - The test objective is to demonstrate acceptable procedures for routine surveillance testing of the turbine stop, control, and bypass valves at a power level as high as possible, without producing a reactor scram.

Prerequisites - The main turbine is operational, and the power testing program is in progress.

Test Method - The individual turbine valves are closed at several points along the 100% power/flow control line, to establish the maximum possible power level for performance of this test, without producing a reactor scram.

Acceptance Criteria - With the plant at power and testing in progress, peak neutron flux is at a value below the scram setting. Peak reactor pressure is at a value below the high pressure scram setting. Peak steam flow in the main steam lines remains at values below the high flow isolation trip setting.

(STP-25) Main Steam Isolation Valves Performance Verification

Test Objectives - The test objectives are: to functionally check the MSIVs for proper operation at selected power levels; to determine reactor transient behavior during and following simultaneous full closure of all MSIVs, and following closure of one valve; and to determine isolation valve closure time.

Prerequisites - Fuel loading is completed, and nuclear steam is available.

Test Method - Functional checks (at least 10% closure) of each isolation valve are performed at selected reactor power levels. A test of simultaneous full closure of all MSIVs is performed at about 100% of rated thermal power. Operation of the RCIC and SRVs is monitored. Reactor process variables are monitored to determine the transient behavior of the system during and following full isolation. The MSIVs closure times are determined.

Acceptance Criteria - MSIV closure times are within applicable limits. Reactor pressure is maintained below specified values during the transient following full closure of all MSIVs.

(STP-26) Main Steam Relief Valves Performance

Test Objectives - The test objectives are: to demonstrate proper operation of the dual-purpose MSRVs and to demonstrate their leak-tightness following operation.

Prerequisites - Factory calibration data are verified, and setting adjustment mechanism factory seals, if applicable, are intact. The reactor is on pressure control with adequate bypass or main steam flow.

Test Method - The MSRVs are opened manually so that only one is opened at any time. Proper resetting of each MSRV is verified by observing temperatures in the MSRV discharge piping. The capacity of each MSRV is measured by opening the MSRV and observing the corresponding decrease in main steam line flow.

Table 14.2-3 (Cont'd)

Acceptance Criteria - Each MSRV flow compares favorably with the value assumed in the accident analysis at design reactor pressure. The leakage of each MSRV is low enough to allow the temperature measured by the thermocouples, in the discharge side of the valves, to fall within an acceptable margin of the temperature recorded, before the valve was opened.

(STP-27) Turbine Trip and Generator Load Rejection Demonstration

Test Objectives - The test objectives are: to determine the response of the reactor system to a turbine trip or generator load rejection; and to evaluate the response of the bypass, SRV, and the reactor protection systems.

Prerequisites - Logic testing of generator lockouts to produce a direct turbine trip are completed. Fuel loading is completed, and the power testing is completed to the extent necessary for performing this test.

Test Method - Dynamic transients are induced at selected reactor power levels by manual turbine trips. Neutron flux, feedwater flow and temperature, and vessel water level and pressure are monitored. Responses of selected control valves, stop valves, SRVs, and bypass valves are recorded. The peak values and the rate of change of both reactor power and reactor steam dome pressure are recorded. The capacity of the turbine bypass valves is checked.

Acceptance Criteria - The turbine control valves and the stop valves close during the stop valve fast closure test. Feedwater settings prevent flooding of the steam lines following these transients. The measurement of simulated heat flux is not significantly greater than preanalysis. The trip at less than 25% power does not cause a scram. The pressure regulator regains control before a low pressure reactor isolation occurs. Turbine bypass flow capacity compares favorably with the value assumed in the accident analysis (Vendor Test Specification). The flow coast-down characteristics of the recirculation pump are reconfirmed as part of the turbine trip demonstration at near rated power and flow.

(STP-28) Shutdown from Outside the Main Control Room Demonstration

Test Objective - The test objective is to demonstrate that the power plant can be safely shut down from outside the control room, to demonstrate that the power plant can be maintained in a hot standby condition from outside the control room, and to demonstrate that the power plant can be safely cooled from hot standby to cold shutdown conditions from outside the control room.

Prerequisites - Preoperational testing of plant instrumentation, controls, and systems to be used at the remote shutdown station have been completed. Fuel loading is completed, and the power ascension testing program is in progress.

Test Method - Using only the minimum number of personnel in a shift crew required to be onsite at any one time, the reactor is manually scrammed from outside the control room and placed in hot standby condition from the remote shutdown station. The plant is maintained in hot standby condition for at least 30 minutes. Using additional personnel who could be made available prior to the time cooldown would be initiated, initiate a plant cooldown from hot standby conditions from outside the control room. Initiate RHR system operation and demonstrate the ability to achieve cold shutdown conditions from outside the control room.

Table 14.2-3 (Cont'd)

Acceptance Criteria -

a. Shutdown to hot standby can be achieved.

b. Plant can be maintained at stable hot standby. Reactor water level and pressure can be controlled.

c. Reactor coolant temperature and pressure can be lowered sufficiently to place the RHR system in operation.

d. A heat transfer path to the spray pond can be established.

e. Cooldown with the RHR system can be controlled to a rate that would not exceed technical specification limits.

(STP-29) Recirculation Flow Control Demonstration

Test Objective - The test objective is to determine the plant response to a change in recirculation flow, to optimize the setting of the master flow controller, and to demonstrate the plant loading capability in master manual flow control mode.

Prerequisites - The reactor is in a steady-state condition and the feedwater system is operating in three-element control.

Test Method - Data are recorded during the step and ramp changes. The final controller settings for both the master flow controller and the individual loop speed controllers are determined.

Acceptance Criteria - The decay ratio for each process variable that exhibits oscillatory response to flow control changes is acceptable. The plant response to a change in recirculation flow is acceptable. The plant loading capability in the master manual flow control mode is acceptable (Vendor Test Specification).

(STP-30) Recirculation System (Unit 1)

Test Objectives - The test objectives are: to determine transient responses and steady-state conditions following recirculation pump trips at selected power levels; to obtain jet pump performance data; and to demonstrate that no recirculation system cavitation occurs in the operation region of the power/flow map.

Prerequisites - The recirculation system preoperational test is completed; the process computer is available; and power testing is in progress.

Table 14.2-3 (Cont'd)

Test Method - Single-pump and two-pump trips are performed from specified power levels. The single-pump trips are initiated by opening the generator field breaker on the applicable motor generator or by opening the MG set drive motor breaker. The two-pump trip is initiated by tripping the recirculation pump trip breakers. Reactor pressure, reactor level, steam and feedwater flow, and neutron flux are recorded during the transient and steady-state conditions. The data recorded during rated power operation verify the noncavitation performance of the recirculation pumps and the jet pumps.

Acceptance Criteria - All responses to the pump trip test transients are within limits. Pump performance testing under operating conditions verifies the noncavitation within the operating range. Plant stability is within specified limits.

(STP-30) Recirculation System (Unit 2)

Test Objectives - The test objectives are: to determine transient responses and steady-state conditions following recirculation pump trips at selected power levels; and to obtain jet pump performance data.

Prerequisites - The recirculation system preoperational test is completed; the process computer is available, and power testing is in progress.

Test Method - Single-pump and two-pump trips are performed from specified power levels. The single-pump trips are initiated by opening the generator field breaker on the applicable motor generator or by opening the MG set drive motor breaker. The two-pump trip is initiated by tripping the recirculation pump trip breakers. Reactor pressure, reactor level, steam and feedwater flow, and neutron flux are recorded during the transient and steady-state conditions.

Acceptance Criteria - All responses to the pump trip test transients are within limits. Plant stability is within specified limits.

(STP-31) Loss of Turbine-Generator and Offsite Power

Test Objective - The test objective is to demonstrate the performance of the reactor and plant electrical equipment and systems, during the loss of auxiliary power transient.

Prerequisites - The diesel generators are in the automatic start mode, and the plant is operating at power.

Test Method - The loss of auxiliary power test is performed at nominal 25% rated power. The proper response of reactor plant equipment, automatic switching equipment, and the proper sequencing of the diesel generator load are checked. Appropriate reactor parameters are recorded during the resultant transient.

Acceptance Criteria - All safety systems function as required, without manual assistance. Reactor steam dome pressure is maintained below acceptable limits. Normal reactor cooling systems are capable of maintaining adequate suppression pool water temperature, adequate drywell cooling, and of preventing actuation of the ADS.

Table 14.2-3 (Cont'd)

(STP-32) Essential HVAC System Operation and Containment Hot Penetration Temperature Verification

Test Objective - The test objective is to demonstrate, under actual operating conditions, satisfactory performance of the drywell, control enclosure, control room, reactor enclosure, and radwaste enclosure HVAC systems and to verify that concrete temperature surrounding hot penetrations remain within specified limits.

Prerequisites - Air flow balancing, cooling water balancing, and fuel loading are completed; power ascension testing is in progress.

Test Method - Air temperatures are monitored and recorded at nominal 50% and 100% power. Space temperatures are not allowed to exceed predetermined maximum temperatures. Adjustments to air and/or cooling water flows are made, if required, to maintain temperature within specified limits. Concrete temperatures surrounding hot penetrations are monitored and recorded.

Acceptance Criteria - The drywell, control enclosure, control room, reactor enclosure, and radwaste HVAC systems provide adequate cooling, and concrete temperatures surrounding hot penetrations remain within specified limits.

(STP-33) Piping Steady-State Vibration Measurements

Test Objective - The test objective is to obtain vibration measurements on selected safety-related NSSS piping and selected BOP piping (Table 3.9-7), located both inside and outside of the primary containment. The test results are used to demonstrate the mechanical integrity of the selected systems to flow-induced vibration, and to check the validity and accuracy of the analytical models.

Prerequisites - Engineering review of the piping system is complete. The required preoperational test has been completed. Instrumentation has been installed and calibrated.

Test Method - The systems to be tested are operated in their normal modes, and data are collected at specified power levels. The empirical data are analyzed to determine test results.

Acceptance Criteria - Analysis of the empirical data satisfies the requirements of applicable criteria and calculations. The steady-state vibration of the piping system is qualified as acceptable by visual inspection, if the level of vibration is too small to be detected by the naked eye, and, in the analyst's judgement, the possibility of damage is minimal; or the stresses in the piping based on the measured maximum displacement due to steady-state vibration are less than the endurance limit of the material as specified in Section 3.9.2.1b.2.

(STP-34) Offgas System Performance Verification

Test Objective - The test objective is to demonstrate proper operation of the offgas system under its expected operating conditions.

Prerequisites - Fuel loading is completed, and power ascension testing is in progress.

Table 14.2-3 (Cont'd)

Test Method - At startup flow and again at normal flow, the flows, temperatures, and pressures at selected locations are recorded and checked to see if they are within acceptable limits. The hydrogen concentration, drainage of condensate, dilution flow, and charcoal system operability are checked periodically throughout plant startup. The catalytic recombiner is operated, and its operating characteristics are recorded. Grab samples are taken periodically for radionuclide analysis.

Acceptance Criteria - The release of gaseous and airborne radioactive effluents does not exceed the limits specified in the Technical Specifications. The system measured variables are within acceptable limits of design. The catalytic recombiner, carbon beds, and filters perform properly.

(STP-35) Recirculation Flow Calibration

Test Objective - The test objective is to perform a complete calibration of the installed recirculation system flow instrumentation.

Prerequisites - The reactor is operating in a steady-state condition. Flow instrumentation static calibration is completed prior to the first flow calibration. The zero setting on transmitters is checked and adjusted prior to a flow calibration.

Test Method - With the reactor in a steady-state condition, recirculation flow data are recorded. The data are analyzed to determine the required adjustments on APRM and RBM flow units, and the jet pump loop flow proportional amplifiers. The resulting settings are documented on the instrument data sheets, for the owner's records.

Acceptance Criteria - Jet pump flow instruments are adjusted so that the jet pump total flow recorder provides a correct core flow indication at rated conditions. The APRM/RBM flow bias instrumentation is adjusted to function properly at rated conditions.

(STP-36) Piping Dynamic Transient

Test Objectives - The objective of this test is to verify the design adequacy of the piping systems for the transients indicated in Table 3.9-7.

Prerequisites - An engineering review of the piping system after construction is completed. The required preoperational tests have been completed. Instrumentation has been installed and calibrated.

Test Method - Response of the piping system (displacements or restraint loads) is measured during the transient event specified.

Acceptance Criteria - The measured response of the piping system and restraint loads shall be less than the acceptable response determined by analysis as specified in Section 3.9.2.1b.1.

(STP-37) DELETED

(STP-38) DELETED

Table 14.2-3 (Cont'd)

(STP-70) Reactor Water Cleanup System Performance Verification

Test Objective - The test objective is to demonstrate specific aspects of the mechanical operability of the RWCU system.

Prerequisites - The RWCU system preoperational test is completed satisfactorily. The reactor is operated at, or near, rated temperature and pressure, long enough to achieve a steady-state condition.

Test Method - The system is operated in blowdown, hot shutdown, and normal modes to provide data for analysis. The system is allowed to stabilize in each mode prior to recording of data. These data are analyzed to determine the test results.

Acceptance Criteria - The data indicates operation in the listed modes is satisfactory.

(STP-71) Residual Heat Removal System Performance Verification

Test Objectives - The test objectives are to demonstrate the ability of the RHR system to remove residual and decay heat from the nuclear system, so that refueling and nuclear system servicing can be performed.

Prerequisites - The RHR system preoperational test is completed satisfactorily.

Test Method - Two modes are tested to verify system capability under actual operating conditions. The modes to be tested are the shutdown cooling and the suppression pool cooling modes. During the operation, the heat transfer rate is controlled to maintain acceptable reactor pressure vessel RPV cooldown rates. Data are recorded before and during each portion of testing. The empirical data are analyzed to verify the satisfactory operation of the RHR system within the limits of acceptance criteria.

Acceptance Criteria - The RHR system is capable of operating at an acceptable flow rate and heat removal capability.

Table 14.2-4

PREOPERATIONAL TEST PROCEDURE ABSTRACTS

(P-2.1) 125 V (Div III, IV) Dc Safeguard Power System

Unit Scope -

a. 1P-2.1 (Unit 1 and portions of Unit 2 system components)

b. 2P-2.1 (Unit 2 remaining system components)

Test Objective - The test objective is to demonstrate the ability of the 125 V dc safeguard power system to provide an uninterruptible source of power to the 125 V dc distribution panels.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Batteries are filled with electrolyte to normal level, and 440 V ac power is available to provide power to the battery chargers. The load resistor bank is available to support the battery load capacity test. Battery room ventilation and emergency eyewash are available and operational.

Test Method - Battery charger capacity is verified by the application of its full load rating for 8 hours. Battery capacity is verified by the application of a constant test load at the battery manufacturer's 4 hour rate. System response to the design load profile is verified by the application of stepped test currents. Battery system recharge characteristics are determined by integrating amp-hours into the battery following the design load profile discharge test.

Acceptance Criteria -

a. The ac input voltage to the battery chargers is within specified limits. (Vendor Technical Manual)

b. The dc distribution equipment is connected to the proper safety division. (Section 8.3.2.1.1)

c. The battery capacity is equal to or greater than that specified. (Table 8.3-18)

d. The battery capacity is sufficient to supply the specific application requirements with respect to the calculated load discharge profile. (Table 8.3-18)

e. The battery will accept a charge equal to or greater than the number of amp-hours required to restore the energy dissipated during a design load discharge test within 8 hours while the charger maintains normal plant loads. (Section 8.3.2.1.1.3)

f. The battery chargers will supply rated load or greater for 8 hours without degradation. (Section 8.3.2.1.1.3 and Vendor Technical Manual)

g. The battery chargers will supply regulated and conditioned dc within specified limits. (Vendor Technical Manual)

Table 14.2-4 (Cont'd)

h. Battery system off-normal conditions are properly identified and annunciated. (Sections 8.3.2.1.1.2 and 8.3.2.1.1.3)

(P-2.2) 125/250 V (Div I, II) Dc Safeguard Power System

Unit Scope -

a. 1P-2.2 (Unit 1 and portions of Unit 2 system components)

b. 2P-2.2 (Unit 2 remaining system components)

Test Objective - The test objective is to demonstrate the ability of the 125/250 V dc safeguard power system to provide an uninterruptible source of power to the 125/250 V dc motor control centers and to various 125 V dc distribution panels.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Batteries are filled with electrolyte to normal level, and 440 V ac power is available to provide power to the battery chargers. The load resistor bank is available to support the battery load capacity test. Battery room ventilation and emergency eyewash are available and operational.

Test Method - Battery charger capacity is verified by the application of its full load rating for 8 hours. Battery capacity is verified by the application of a constant test load at the battery manufacturer's 4 hour rate. System response to the design load profile is verified by the application of stepped test currents. Battery system recharge characteristics are determined by integrating amp-hours into the battery following the design load profile test.

Acceptance Criteria -

a. The ac input voltage to the battery chargers is within specified limits. (Vendor Technical Manual)

b. The dc distribution equipment is connected to the proper safety division. (Section 8.3.2.1.1)

c. The battery capacity is equal to or greater than that specified. (Table 8.3-18)

d. The battery capacity is sufficient to supply the specific application requirements with respect to the calculated load discharge profile. (Table 8.3-18)

e. The battery will accept a charge equal to or greater than the number of amp-hours required to restore the energy dissipated during a design load discharge test within 8 hours while the charge maintains normal plant loads. (Section 8.3.2.1.1.3)

f. The battery chargers will supply rated load or greater for 8 hours without degradation. (Section 8.3.2.1.1.3 and Vendor Technical Manual)

Table 14.2-4 (Cont'd)

g. The battery chargers will supply regulated and conditioned dc within specified limits. (Vendor Technical Manual)

h. Battery system off-normal conditions are properly identified and annunciated. (Section 8.3.2.1.1.2 and 8.3.2.1.1.3)

(P-3.1) 13.2 kV Unit Auxiliary Power System

Unit Scope -

a. 1P-3.1 (Unit 1, common, and portions of Unit 2 system components)

b. 2P-3.1 (Unit 2 remaining system components)

Test Objective - The test objective is to demonstrate the capability of the 13.2 kV unit auxiliary power system to provide reliable electrical service to the 13.2 kV buses, which include feeder breakers for the 4 kV safeguard power system.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Offsite power is available from both the 220 kV and the 500 kV substations. 125 V dc control power is available and operational.

Test Method - The 13.2 kV unit auxiliary buses are energized from both offsite power sources, and alarms and control devices are actuated.

Acceptance Criteria -

a. System breakers operate properly. (Vendor Technical Manual)

b. System automatic transfer circuits operate properly. (Electrical Schematic Diagrams)

c. Feeder breaker interlocks operate properly. (Electrical Schematic Diagrams)

d. System alarms operate properly. (Electrical Schematic Diagrams)

(P-4.1) 4 kV Safeguard Power System

Unit Scope -

a. 1P-4.1 (Unit 1 and common system components)

b. 2P-4.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the capability of the 4 kV safeguard power system to provide reliable electrical service to the 4 kV buses.

Table 14.2-4 (Cont'd)

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The 13.2 kV power and 125 V dc control power are available and operational.

Test Method - The 4 kV buses are energized, and system alarms and control devices are actuated.

Acceptance Criteria -

a. System breakers operate properly. (Section 8.3.1.1.2)

b. System automatic transfer circuits operate properly. (Section 8.3.1.1.2)

c. Feeder breaker interlocks operate properly. (Section 8.3.1.1.2)

d. System alarms operate properly. (Section 8.3.1.1.2)

(P-5.1) Safeguard 440 V Load Centers

Unit scope -

a. 1P-5.1 (Unit 1 system components)

b. 2P-5.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the capability of the safeguard 440 V load centers to provide reliable power to connected 440 V loads and motor control centers.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The 4 kV buses are available for energization of the 440 V load centers. The 125 V dc control power is available for operation of the 4 kV switchgear breakers.

Test Method - Breakers are operated to energize the 440 V load centers and motor control centers. System alarms and controls, both manual and automatic, are actuated.

Acceptance Criteria -

a. System breakers operate properly. (Section 8.3.1.1.2)

b. System bus voltages meet acceptable voltages. (Section 8.3.1.1.2)

c. System alarms operate properly. (Section 8.3.1.1.2)

(P-6.1) Safeguard 440 V Motor Control Centers

Unit scope -

a. 1P-6.1 (Unit 1 system components)

Table 14.2-4 (Cont'd)

b. 2P-6.1 (Unit 2 system components)

Test Objectives - The test objective is to demonstrate the capability of the safeguard 440 V motor control centers to provide reliable power to the motor control centers panels and loads.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The 440 V Class 1E load centers are available for energization of the 440 V motor control centers. 125 V dc control power is available for operation of the switchgear breakers.

Test Method - Breakers are operated to energize the 440 V motor control centers. System alarms and controls, both manual and automatic, are actuated.

Acceptance Criteria -

a. System breakers operate properly. (Section 8.3.1.1.2)

b. System bus voltages are acceptable. (Section 8.3.1.1.2)

c. System alarms operate properly. (Section 8.3.1.1.2)

(P-7.1) Standby Dc Lighting System

Unit scope -

a. 1P-7.1 (Unit 1 system components)

b. 2P-7.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the ability of the standby dc lighting system to provide emergency lighting on loss of normal lighting power.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Offsite ac power and 125 V dc power are available.

Test Method - The standby dc lighting panels are energized from their normal ac supply. The normal power supply is interrupted, and 125 V dc power is verified as an emergency lighting power source. Adequate illumination exists for safe plant operation.

Acceptance Criteria -

a. System breakers operate properly. (Section 9.5.3.2.2)

b. System supply voltages are acceptable. (Section 9.5.3.2.2)

c. System automatic transfer devices operate properly. (Section 9.5.3.2.2)

Table 14.2-4 (Cont'd)

d. Adequate illumination exists for safe plant operation. (Section 9.5.3.2.2)

(P-11.1) Service Water System

Unit Scope -

a. 1P-11.1 (Unit 1, common, and portions of Unit 2 system components)

b. 2P-11.1 (Unit 2 remaining system components)

Test Objective - The test objective is to demonstrate the ability of the service water system to furnish cooling water to the heat exchangers, chillers, coolers, and condensers in the control structure, turbine, reactor, and radwaste buildings; to furnish dilution and injection water to the chlorination and acid systems; and to furnish seal water to miscellaneous components.

Prerequisites - To the extent necessary to perform this test, the construction is completed and instrumentation and controls are operable. The circulating pump structure and cooling tower basin are available and operable to support this test.

Test Method - Operate the service water pumps in single and dual pump modes, and verify adequate flow to the service water components.

Acceptance Criteria -

a. Service water pumps operate properly. (Section 9.2.1)

b. Service water system provides an adequate water supply to system loads in the normal mode of operation. (Section 9.2.1)

c. Service water system provides an adequate water supply to system loads in the winter bypass mode of operation. (Section 9.2.1)

d. System alarms operate properly. (Section 9.2.1)

(P-13.1) Fire Protection Water System

Unit Scope -

a. 1P-13.2 (Unit 1, common, and portions of Unit 2 system components)

b. 2P-13.2 (Unit 2 remaining system components)

Test Objectives - The test objective is to demonstrate that the fire protection water system operates as designed, to supply fire water to required areas.

Table 14.2-4 (Cont'd)

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Sufficient water is available in the cooling tower basin to conduct the test.

Test Method - The fire protection water system is placed in operation, and performance data are obtained for the diesel and electric fire pumps. System controls and alarms are actuated, including auto and manual initiation of system sprinklers. The transformer deluge is activated and the system hose reel and hydrants are operated.

Acceptance Criteria -

a. System pumps meet acceptable head and flow values. (Section 9.5.1)

b. System automatic and manual initiation operate properly. (Section 9.5.1)

c. System sprinklers operate properly. (Section 9.5.1)

d. System hydrants and hose reels operate properly. (Section 9.5.1)

e. System deluge patterns are acceptable. (Section 9.5.1)

(P-13.2) Fire Protection CO_2 System

Unit Scope -

a. 1P-13.2 (Unit 1, common, and portions of Unit 2 system components)

b. 2P-13.2 (Unit 2 remaining system components)

Test Objectives - The test objective is to demonstrate the capability of the fire protection carbon dioxide system to initiate CO_2 release to designated areas, as designed.

Prerequisites - To the extent necessary to perform this test, construction is completed and instrumentation and controls are operable and calibrated. Sufficient CO_2 is available for the required discharge tests.

Test Method - CO_2 discharge is initiated manually. Operation of dampers by CO_2 is verified.

Acceptance Criteria -

a. System manual initiation operates properly. (Section 9.5.1)

b. Damper operation is acceptable. (Section 9.5.1)

c. System alarms operate properly. (Section 9.5.1)

Table 14.2-4 (Cont'd)

(P-13.3) Fire Protection Air Foam System

Unit Scope -

a. 1P-13.3 (Unit 1 and common)

Test Objective - The test objective is to demonstrate that the fire protection air foam system delivers air foam to designated areas.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The fire protection water system is operable and capable of supplying sufficient water to the foam eductor.

Test Method - The air foam system is manually initiated, and foam is produced.

Acceptance Criteria -

a. System manual initiation operates properly. (Section 9.5.1.2.5)

b. System foam production is acceptable. (Section 9.5.1.2.5)

(P-13.4) Smoke Detection System

Unit scope -

a. 1P-13.4 (Unit 1 system components)

b. 2P-13.4 (Unit 2 system components)

Test Objectives - The test objective is to demonstrate the proper operation of the smoke detection system.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - Smoke, fire, and trouble conditions are simulated, and system local and remote alarms and indication are verified.

Acceptance Criteria -

a. System detectors operate properly. (Section 9.5.1.2.9 and Appendix 9A.2.12)

b. System alarms and indicators operate properly. (Section 9.5.1.2.9 and Appendix 9A.2.12)

Table 14.2-4 (Cont'd)

(P-13.5) Fire Protection Halon System

Unit scope -

a. 1P-13.5 (Unit 1 system components)

b. 2P-13.5 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the capability of the fire protection halon to all floor sections, as designed.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Sufficient Halon is available for the required discharge tests.

Test Method - Smoke and heat detectors are activated, and automatic initiation is simulated. System is manually initiated, and proper Halon distribution is verified. Trouble conditions are simulated, and proper alarm annunciation is verified.

Acceptance Criteria -

a. Smoke detectors actuate early warning alarms. (Section 9.5.1.2.7)

b. Heat detectors actuate predischarge alarms followed by automatic discharge after a time-delay. (Section 9.5.1.2.7)

c. System automatic and manual initiation is acceptable. (Section 9.5.1.2.7)

d. Halon distribution to all floor sections is acceptable. (Section 9.5.1.2.7)

e. System alarms operate properly. (Section 9.5.1.2.7)

(P-14.1) Reactor Enclosure Cooling Water System

Unit Scope -

a. 1P-14.1 (Unit 1 system components)

b. 2P-14.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the ability of the RECW system to provide sufficient cool water to designated equipment in the reactor enclosure.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The service water system is available to provide cooling water for the system.

Table 14.2-4 (Cont'd)

Test Method - The RECW system is placed in operation, and pump performance data are obtained. System controls and alarms are actuated.

Acceptance Criteria -

a. System pumps meet acceptable head and flow values. (Section 9.2.8.2)

b. System head tank level controls maintain tank level properly. (Section 9.2.8.2)

c. System pump automatic start features operate properly. (Section 9.2.8.2)

d. The reactor recirculation pump seal and motor oil cooler isolation valves and their logic circuits operate properly. (Section 9.2.8.2)

e. Flow is verified to each system component. (Section 9.2.8.2)

f. System alarms operate properly. (Section 9.2.8.5)

(P-15.1) Turbine Enclosure Cooling Water System

Unit Scope -

a. 1P-15.1 (Unit 1 system components)

b. 2P-15.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the ability of the TECW system to provide sufficient cooling water to designated equipment in the turbine enclosure.

Prerequisites - To the extent necessary to perform this test, construction is completed and instrumentation and controls are operable and calibrated. The service water system is available to provide cooling water for the system.

Test Method - The TECW system is placed in operation, and pump performance data is obtained. System controls and alarms are actuated.

Acceptance Criteria -

a. System pumps operate properly. (Section 9.2.9)

b. Standby pump automatic starting controls function properly. (Section 9.2.9)

c. System head tank level controls maintain proper tank level. (Section 9.2.9)

d. System provides cooling water to system components. (Section 9.2.9)

e. System alarms operate properly. (Section 9.2.9)

Table 14.2-4 (Cont'd)

(P-16.1) Residual Heat Removal Service Water System

Unit Scope -

a. 1P-16.1 (Unit 1, common, and portions of Unit 2 system components)

b. 2P-16.1 (Unit 2 remaining system components)

Test Objective - The test objective is to demonstrate that under normal and emergency conditions, the RHRSW system supplies cooling water as designed.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Required portions of the cooling tower are operable, and the spray pond has water to operate the RHRSW pumps. The RHR heat exchangers are installed to provide a flow path for the pumps. The ESW system is available to support the flow verification test, as applicable.

Test Method - The RHRSW pumps and their controls are operated, and flow is measured for normal system operation modes. System automatic valve alignment is initiated for high radiation and ESW pump start. The high radiation pump trip and the manual override operations are conducted. The spray networks are visually inspected for evenly distributed flow. System alarms are also actuated.

Acceptance Criteria -

a. System pumps meet acceptable head and flow values for different system modes of operation. (Section 9.2.3.2)

b. System logic circuits operate properly. (Section 9.2.3.2)

c. System is operable from both the control room and the remote shutdown panel. Remote shutdown panel instrumentation operates properly. (Section 9.2.3.2)

d. RHRSW cross-ties to the cooling towers and to the ESW system pump circuits operate properly. (Section 9.2.3.2)

e. System alarms operate properly. (Section 9.2.3.5)

f. All key-locks and automatic features operate properly. (Section 9.2.3.2)

(P-17.1) Instrumentation Ac Power System

Unit Scope -

a. 1P-17.1 (Unit 1 system components)

b. 2P-17.1 (Unit 2 system components)

Table 14.2-4 (Cont'd)

Test Objectives - The test objective is to demonstrate the capability of the instrumentation ac power system to supply electrical power to the 120 V ac instrument panels.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The 440 V ac power is available for energization of the instrumentation ac panels.

Test Method - Breakers are operated to energize the instrument ac panels, and system alarms and control devices are actuated.

Acceptance Criteria -

a. System 440 V ac breakers operate properly. (Vendor Technical Manual)

b. System bus voltages are acceptable. (Section 8.3.1.1.2)

c. System ac electrical power is available to all system distribution panels and instrument panels. (Electrical Single-Line Diagram)

(P-18.1) Instrument Air System

Unit Scope -

a. 1P-18.1 (Unit 1, common, and portions of Unit 2 system components)

b. 2P-18.1 (Unit 2 remaining system components)

Test Objective - The test objective is to demonstrate the capability of the instrument air system to provide dry compressed air at the rated capacity.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Air dryer chambers are filled with desiccant, and TECW is available.

Test Method - The system is placed in operation both automatically and manually, and performance data are obtained. Proper air distribution is verified. System control devices and alarms are actuated.

Acceptance Criteria -

a. System compressors discharge pressure, temperature, and capacity are within specified limits. (Section 9.3.1.1.2)

b. Compressor trips, interlocks, and automatic start logic operate properly. (Section 9.3.1.1.2)

c. Air dryer cycles are proper, and air moisture content is maintained within specified limits. (Section 9.3.1.1.2)

Table 14.2-4 (Cont'd)

d. System supplies air to each major distribution area. (Section 9.3.1.1.2)

e. System alarms operate properly. (Section 9.3.1.1.5)

(P-23.1) Diesel Generator Fuel Oil System

Unit Scope -

a. 1P-23.1 (Unit 1 and common system components)

b. 2P-23.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate that the diesel generator fuel oil system is capable of supplying fuel oil to the standby diesel generator day tanks.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are available and operational. Adequate fuel oil is present in the diesel oil storage tanks.

Test Method - The diesel oil transfer pumps are operated, and performance data are measured. System alarms and control devices are also actuated.

Acceptance Criteria -

a. System pumps meet acceptable delivery capability. (Section 9.5.4.2)

b. Automatic operation of the diesel oil transfer pumps is acceptable. (Section 9.5.4.2)

c. Each diesel oil transfer pump is capable of supplying any of the four diesel oil day tanks. (Section 9.5.4.2)

d. System alarms operate properly. (Section 9.5.4.5)

(P-24.1) Standby Diesel Generator System

Unit Scope -

a. 1P-24.1 (Unit 1 system components)

b. 2P-24.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the capability of the standby diesel generator system to provide reliable electric power to Class 1E buses.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Temporary cooling water, diesel

Table 14.2-4 (Cont'd)

generator enclosure HVAC, 125 V dc power, fuel oil, and fire protection are available for diesel generator operation.

Test Method - The diesel generators are started both manually and automatically. Starting times and repetitive starting capability are determined. Diesel generator and auxiliary systems performance is measured and adequate reliability is demonstrated. System protection alarms and controls are also actuated. This test, in conjunction with Tests P-100.1 (Loss of Offsite Power) and P-100.4 (Standby Diesel Generator Loading), constitutes the individual diesel generator preoperational testing program.

Acceptance Criteria -

a. Each diesel generator is automatically started on simulated automatic actuation signals and reaches the required voltage and frequency within an acceptable time. (Section 8.3.1.1.3)

b. Electrical interlocks between the diesel generators and their associated 4 kV buses operate properly. (Section 8.3.1.1.3)

c. Each diesel generator is capable of being stopped and started manually from local and remote locations. (Section 8.3.1.1.3)

d. Each diesel generator air starting system, fuel oil system, oil lubrication system, and its air supply and exhaust systems operate properly. (Sections 9.5.4, 9.5.6, 9.5.7, and 9.5.8)

e. Each system breaker operates properly. (Vendor Technical Manual)

f. System alarms and logics operate properly. (Section 8.3.1.1.3)

g. Each diesel generator operates properly during the transient following a complete loss of load. (Section 8.3.1.1.3)

h. When operating in test (droop) mode parallel to the grid, each diesel generator breaker opens and governor converts to automatic (isochronous) mode upon receipt of a LOCA signal, and continues to operate.

i. Each diesel generator is capable of starting a minimum of 23 consecutive times with no failures.

(P-25.1) Primary Containment Instrument Gas System

Unit Scope -

a. 1P-25.1 (Unit 1 system components)

b. 2P-25.1 (Unit 2 system components)

Test Objective - The test objectives are to demonstrate the capability of the PCIG system to provide compressed gas at proper temperature and moisture content for containment services, and to demonstrate system isolation following a primary containment isolation signal.

Table 14.2-4 (Cont'd)

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The service water system is available to provide the cooling water requirements of the system, as applicable.

Test Method - The system is placed in operation automatically and manually, and performance data are obtained. System controls and alarms are actuated, including operation of the systems containment isolation valves upon a simulated primary containment isolation signal. System valves are realigned to utilize the backup containment instrument gas supply from the plant instrument air system.

Acceptance Criteria -

a. System compressors meet acceptable values of discharge pressure and capacity. (Section 9.3.1.3)

b. Compressor trips, interlocks, and start logic operate properly. (Section 9.3.1.3)

c. System isolation valves operate properly. (Section 6.2.4)

d. System alarms operate properly. (Section 9.3.1.3.5)

e. Gas temperature and moisture content are maintained within specified limits. (Section 9.3.1.3)

f. Both system components fail independently. (Section 9.3.1.3)

(P-28.1) Diesel Generator Enclosure HVAC System

Unit Scope -

a. 1P-28.1 (Unit 1 system components)

b. 2P-28.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the capability of the standby diesel generator enclosure HVAC system to provide air flow to respond to simulated room temperature variations.

Prerequisites - To the extent necessary to perform this test, construction is completed and instrumentation and controls are operable and calibrated.

Test Method - The fans are started automatically and manually. System alarms are also actuated.

Acceptance Criteria -

a. Each diesel generator cell's unit heaters operate properly. (Section 9.4.6)

b. Each cell's exhaust fans operate properly. (Section 9.4.6)

c. Enclosure cell exhaust fan and damper operating logic, including automatic start, automatic stop, and standby operation, operates properly. (Section 9.4.6)

d. System alarms operate properly. (Section 9.4.6.5)

(P-28.2) Spray Pond Pumphouse HVAC System

Unit Scope -

a. 1P-28.2 (Common system components)

Test Objective - The test objective is to demonstrate the capability of the spray pond pumphouse HVAC system to provide air flow and temperature control in the pumphouse.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - The spray pond pumphouse HVAC system is placed in service. Enclosure temperature variations are simulated and system response verified. System controls, logics, and alarms are actuated. System parameters are monitored and recorded.

Acceptance Criteria -

a. Each system unit heater operates properly. (Section 9.4.7)

b. Each system supply fan operates properly. (Section 9.4.7)

c. Supply fan and damper logic operates properly. (Section 9.4.7.5)

d. System alarms operate properly. (Section 9.4.7.5)

(P-30.1) Control Enclosure HVAC System

Unit Scope -

a. 1P-30.1 (Unit 1, Unit 2 and Common system components)

Test Objective - The test objective is to demonstrate the capability of the control enclosure HVAC system to provide air flow and temperature control in the structure by simulated room temperature variations.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. North vent stack and battery room exhaust fans are available for system operation.

Test Method - Control structure temperature variations are simulated and system response verified. The auxiliary equipment enclosure is purged, and system alarms and control devices are actuated. System parameters are monitored and recorded for systems cooling ESF components.

Table 14.2-4 (Cont'd)

Acceptance Criteria -

a. System fans operate properly. (Section 9.4.1)

b. System unit heaters operate properly. (Section 9.4.1)

c. System automatic start features and fan interlocks operate properly. (Section 9.4.1)

d. System fan and damper logic operates properly. (Section 9.4.1)

e. System alarms operate properly. (Section 9.4.1.9)

f. Results of in-place filter efficiency testing are acceptable.

(P-30.2) Control Enclosure Chilled Water System

Unit Scope -

a. 1P-30.2 (Common system components)

Test Objective - The test objective is to demonstrate the ability of the CECWS to provide chilled water flow for cooling the air supply to the control room, the auxiliary equipment compartment, the emergency auxiliary switchgear and battery compartments, and the SGTS area.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The demineralized water and ESW systems are available to provide the water requirement of the system.

Test Method - Chiller operation, chilled water circulation pump operation, and system alignment are initiated by automatic start and manual signals. Flow paths are verified. System alarms are also actuated.

Acceptance Criteria -

a. System circulation pumps meet acceptable head and discharge values. (Section 9.2.10.2)

b. System water chillers operate properly. (Section 9.2.10.2)

c. Flow is verified to each system component. (Section 9.2.10.2)

d. System alarms operate properly. (Section 9.2.10.2)

Table 14.2-4 (Cont'd)

(P-32.1) Control Room HVAC System

Unit Scope -

a. 1P-32.1 (Common system components)

Test Objective - The test objective is to demonstrate the capability of the control room HVAC system to provide air flow and temperature control in the control room by simulated room temperature variations.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - The fans are placed in operation. Control room temperature variations are simulated and system response is verified. Control devices are actuated to automatically align the system and to maintain positive pressure within the control room. Room air leakage is measured and system alarms are also actuated.

Acceptance Criteria -

a. System fans operate properly. (Sections 9.4.1 and 6.4)

b. System fan automatic start features and interlocks operate properly. (Sections 9.4.1 and 6.4)

c. System fan and damper logic operates properly. (Sections 9.4.1 and 6.4)

d. System alarms operate properly. (Sections 9.4.1 and 6.4)

e. Air leakage from control room does not exceed design. (Sections 9.4.1 and 6.4)

(P-32.2) Control Room Isolation and Purge System

Unit Scope -

a. 1P-32.2 (Common system components)

Test Objective - The test objective is to demonstrate the capability of the control room isolation and purge system to isolate the control room from radiation or chlorine entering through the control room ventilation system and to purge the control room of smoke.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The following systems are available for operation: the control room supply and return air system and the control room emergency fresh air supply system.

Test Method - High radiation and chlorine conditions are simulated to verify the automatic isolation of the control room. The control room purge system is actuated and system response verified. System alarms are actuated.

Table 14.2-4 (Cont'd)

Acceptance Criteria -

a. The control room is isolated and maintained at a positive pressure during a high radiation condition. (Sections 9.4.1 and 6.4)

b. The control room emergency fresh air supply system automatically starts during a high radiation condition. (Sections 9.4.1 and 6.4)

c. The control room is completely isolated during a high chlorine condition. (Sections 9.4.1 and 6.4)

d. System purge mode operates properly. (Sections 9.4.1 and 6.4)

e. System alarms operate properly. (Sections 9.4.1 and 6.4)

f. Results of in-place filter efficiency testing are acceptable.

(P-33.1) Turbine Enclosure HVAC System

Unit Scope -

a. 1P-33.1 (Unit 1 system components)

b. 2P-33.1 (Unit 2 system components)

Test Objectives - The test objective is to demonstrate the capability of the turbine enclosure HVAC system to provide air flow and temperature control in the structure by simulated room temperature variations.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - The turbine enclosure HVAC system is placed in operation. Enclosure temperature variations are simulated, and system response is verified. System controls, logics, and alarms are actuated.

Acceptance Criteria -

a. System fans operate properly. (Section 9.4.4)

b. System fan and damper logic operates properly. (Section 9.4.4)

c. System cooling coils and temperature control valves operate properly. (Section 9.4.4)

d. System heating coils and temperature control valves operate properly. (Section 9.4.4)

e. Results of in-place filter efficiency testing are acceptable.

Table 14.2-4 (Cont'd)

f. System alarms operate properly. (Section 9.4.4.5)

(P-34.1) Reactor Enclosure HVAC System

Unit Scope -

a. 1P-34.1 (Unit 1 system components)

b. 2P-34.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the capability of the reactor enclosure HVAC system to provide normal air flow and temperature control in the enclosure.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The turbine enclosure north and south vent stacks are available to support this test.

Test Method - The fans are placed in operation. Control devices are actuated. System alarms are also actuated.

Acceptance Criteria -

a. System fans operate properly. (Section 9.4.2)

b. System fan standby features, interlocks, permissives, and automatic start circuits operate properly. (Section 9.4.2)

c. System alarms operate properly. (Section 9.4.2.2.5)

d. Results of in-place filter efficiency testing are acceptable

(P-34.2) Refueling Area HVAC System

Unit Scope -

a. 1P-34.2 (Unit 1 system components)

b. 2P-34.2 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the capability of the refueling area HVAC system to provide normal air flow and fuel handling accident mode air flow and temperature control to the refueling area.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The turbine enclosure north and south vent stacks are available to support this test. The SGTS is operational.

Test Method - The fans are placed in operation. Control devices are actuated to isolate the refueling area, and the system is operated in its fuel handling accident mode. System alarms are also actuated.

Table 14.2-4 (Cont'd)

Acceptance Criteria -

a. System fans operate properly. (Section 9.4.2)

b. System fan standby features, interlocks, permissives, and automatic start circuits operate properly. (Section 9.4.2)

c. System unit heaters and cooling coil operate properly. (Section 9.4.2)

d. System alarms operate properly. (Section 9.4.2.2.5)

e. Refueling area isolation logic operates properly. (Section 9.4.2)

(P-35.1) Fuel Pool Cooling and Cleanup System

Unit Scope -

a. 1P-35.1 (Unit 1 system components)

b. 2P-35.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the operability of the FPCC system.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Makeup water from the demineralized water tank is available. The RHR system is capable of supplying water to system diffusers.

Test Method - System pumps are placed in operation and system flow paths are verified. System controls are verified. System filter cycles are verified.

Acceptance Criteria -

a. System pumps meet acceptable head and flow values. (Section 9.1.3)

b. System controls operate properly. (Section 9.1.3)

c. Filter hold, precoat, and backwash controls operate properly, (Section 9.1.3)

d. Siphon breaker holes in the system return lines operate properly. (Section 9.1.3)

e. Fuel transfer canal gates prevent excessive water loss from the spent fuel pool when adjacent cavities are empty. (Section 9.1.3)

f. System alarms operate properly. (Section 9.1.3.5)

Table 14.2-4 (Cont'd)

(P-37.1) Condensate and Refueling Water Transfer System

Unit Scope -

a. 1P-37.1 (Unit 1 and common system components)

b. 2P-37.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the ability of the condensate and refueling water transfer system to transfer water from the CSTs and refueling water tanks to various systems.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Demineralized water, plant heating steam, and instrument air systems are operable.

Test Method - System is operated, and power-operated valves are cycled both automatically and manually. Flow is directed through each flow path. Tank levels and temperatures are simulated, and control system operation is verified.

Acceptance Criteria -

a. System pump's head and capacity are within specified limits. (Section 9.2.7)

b. Pump trips and control logic operate properly. (Section 9.2.7)

c. Power-operated valves operate properly. (Section 9.2.7)

d. Condensate and refueling water temperature controls operate properly. (Section 9.2.7)

e. Flow is verified through each major flow path. (Section 9.2.7)

f. System alarms operate properly. (Section 9.2.7.5)

(P-39.1) Condensate Demineralizer System

Unit Scope -

a. 1P-39.1 (Unit 1 system components)

b. 2P-39.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the ability of the condensate demineralizer system to maintain condensate feedwater chemistry and the ability of the precoat and backwash systems to operate properly.

Prerequisites - To the extent necessary to support this test, construction is completed, and instrumentation and controls are operable. The condensate system is operable and lined up to recirculate water to the hotwells via the feed pump bypass and startup recirculation lines. The instrument air system and process sampling systems are operational. Refueling water pumps are operational, and sufficient water is available in the refueling water tank to support this test.

Table 14.2-4 (Cont'd)

For Unit 2, the refueling water pumps and refueling water will not be used prior to tie-in to common plant systems. Unit 2 testing will be performed utilizing temporary equipment in order to avoid contamination. Low pressure air blower is operational, and the backwash receiving tank is operational with sufficient volume to support this test.

Test Method - The filter/demineralizer units are placed in operation, and their controls are operated. Effluent water purity is verified. Flow rates, flow controls, and system flow balancing are verified. Automatic precoat cycle operation is verified for each vessel.

Acceptance Criteria -

a. Vessel cleaning and precoat cycles operate properly. (Vendor Technical Manual)

b. Each demineralizer produces effluent water of the proper quality. (Section 10.4.6)

c. The system flow balancing system operates properly. (Section 10.4.6)

d. The cation and anion feeders supply resin to the precoat tank. (Vendor Technical Manual)

e. The precoat pump and the system hold pumps operate properly. (Section 10.4.6)

f. System pneumatic valves operate properly. (Section 10.4.6)

g. System controls, interlocks, and alarms operate properly. (Section 10.4.6)

(P-41.1) Cooling Tower System

Unit Scope -

a. 1P-41.1 (Unit 1 system components)

b. 2P-41.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the operability of the cooling tower chlorination system, sulfuric acid injection system, icing control system, and makeup water flow control valves.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The service water system, circulating water system, Schuylkill river makeup water system, instrument air system, circulating water pumphouse domestic water supply, and the circulating water pump structure power roof ventilators are operational as required to support the test.

Test Method - The cooling tower chlorination system, sulfuric acid injection system, icing control system, and makeup water flow control valves are placed in operation. Each system response to simulated cooling tower conditions is verified. System controls logics, and alarms are operated.

Table 14.2-4 (Cont'd)

Acceptance Criteria -

a. The cooling tower chlorination system operates properly. (Section 10.4.5.1)

b. The cooling tower sulfuric acid injection system operates properly. (Section 10.4.5.1)

c. The cooling tower icing control system operates properly. (Vendor Technical Manual)

d. The cooling tower makeup water flow control valves operate properly. (Section 10.4.5.2)

e. System alarms operate properly. (Section 10.4.5.1.5)

(P-42.1) Circulating Water System

Unit Scope -

a. 1P-42.1 (Unit 1 system components)

b. 2P-42.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate that the circulating water system delivers cooling water to the main condenser as designed.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The cooling tower is operational, and the circulating water system is filled sufficiently to operate the circulating water pumps. The main condenser is available to receive cooling water.

Test Method - The circulating water pumps and their controls are operated. System flows and flow paths are measured and verified. The water box scavenging pumps and their controls are operated. The main condenser fill and drain system is operated.

Acceptance Criteria -

a. Circulating water pumps head and flow are acceptable. (Section 10.4.5.1)

b. System automatic valves operate properly. (Section 10.4.5.1)

c. System controls, interlocks, and permissives operate properly. (Section 10.4.5.1)

d. Water box scavenging pumps operate properly. (Section 10.4.5.1)

e. Main condenser drain and fill system operates properly. (Section 10.4.5.1)

f. Circulating water winter bypass flow is acceptable. (Section 10.4.5.1)

Table 14.2-4 (Cont'd)

g. System alarms operate properly. (Section 10.4.5.1.5)

(P-43.1) Condenser and Air Removal System

Unit Scope -

a. 1P-43.1 (Unit 1 system components)

b. 2P-43.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the ability of the main condenser air removal system to both pull and hold a vacuum in the main condenser.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are calibrated. The main turbine is on the turning gear with steam seals established.

Test Method - With the turbine on turning gear and necessary support systems operating, the mechanical vacuum pumps are operated to initially pull a vacuum on the main condenser. The SJAEs, using auxiliary steam, are then cut in to maintain an acceptable vacuum.

Acceptance Criteria -

a. The mechanical vacuum pump pulls an acceptable vacuum. (Section 10.4.2)

b. The SJAEs maintain an acceptable vacuum. (Section 10.4.2)

c. System logics and alarms operate properly. (Section 10.4.2.5)

d. System offgas isolation operates properly. (Section 10.4.2)

(P-44.1) Condensate System

Unit Scope -

a. 1P-44.1 (Unit 1 system components)

b. 2P-44.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the ability of the condensate system to supply water to the feedwater system, and the proper operation of system controls.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

The feedwater system is available to provide a flow path back to the main condenser. The condenser and the condensate storage system have sufficient water to operate the condensate pumps. TECW is available.

Table 14.2-4 (Cont'd)

Test Method - The condensate pumps and their controls are operated. System flows and flow paths are measured and verified. Automatic pump minimum flow control as well as the ability of the makeup and reject system to control hotwell level is demonstrated. Major valves are operated to demonstrate the ability to isolate sections of the system.

Acceptance Criteria -

a. Condensate pump head and flow meet acceptable values. (Section 10.4.7.2.1)

b. Pump controls, interlocks, and permissives operate properly. (Section 10.4.7.2.1)

c. System MOVs operate properly. (Section 10.4.7.2.1)

d. System makeup valves and logics operate properly. (Section 10.4.7.2.1)

e. Condensate pump recirculation flow meets acceptable values. (Section 10.4.7.2.1)

f. System alarms operate properly. (Section 10.4.7.5)

(P-45.1) Feedwater System

Unit Scope -

a. 1P-45.1 (Unit 1 system components)

b. 2P-45.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the operability of the reactor feedwater pumps, their turbine drivers, and the feedwater control system, and to verify that the feedwater system functions to the degree that is possible with the limited steam available. For Unit 2 (Test 2P-45.1), an additional objective is to demonstrate the ability of the turbine supervisory system to monitor the operation of the reactor feedwater pump-turbines. For Unit 1 this was tested by Test 1P-93.3.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The condensate system is available for supplying water to the feedwater pumps. The auxiliary steam system is able to supply steam to the feedwater pump-turbine drivers. The main condenser is available to receive the turbine exhaust. The service water system is available to satisfy the system's cooling water requirements.

Test Method - The feedwater pump-turbine drivers are first operated uncoupled from the pumps. After coupling and with the condensate system running, each feedwater pump is operated separately, recirculating water back to the condenser. System controls and alarms are actuated, including operation of the feedwater pump minimum flow valves and the feedwater pump-turbine lube oil system. Feedwater control system inputs are verified. Various inputs are simulated and output response to small and large signal changes is checked.

Table 14.2-4 (Cont'd)

Acceptance Criteria -

a. The reactor feed pumps and turbines operate properly using the auxiliary steam supply. (Section 10.4.7.2.2)

b. Reactor feed pump recirculation valves operate properly. (Section 10.4.7.2.2)

c. Reactor feed pump turbine lube oil systems operate properly. (Section 10.4.7.2.2)

d. Reactor feed pump seals operate properly. (Section 10.4.7.2.2)

e. Feedwater control system inputs operate properly. (Section 7.7.1.4)

f. Feedwater control system response is proper to simulated small and large signal changes. (Section 7.7.1.4)

g. System MOVs and AOVs operate properly. (Section 10.4.7.2.2)

h. System instruments and alarms operate properly. (Sections 10.4.7.3 and 10.2.5.a and Vendor Technical Manual)

i. Each feed pump and its associated feedwater heater can be isolated for maintenance with pressure in the system. (Section 10.4.7.2.2)

j. Feedwater control system outputs are proper during simulated operation. (Section 7.7.1.4)

(P-46.1) Extraction Steam and Feedwater Heater System

Unit Scope -

a. 1P-46.1 (Unit 1 system components)

b. 2P-46.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate operability of the extraction steam and feedwater heater level control and automatic isolation systems.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - Turbine trip and pressure signals are simulated, and automatic isolation valve and bleeder trip check valve operation are verified. Feedwater heater level signals are simulated to verify proper response of drain valves, dump valves, bleeder trip valves, and extraction line drain valves. System alarms are actuated.

Acceptance Criteria -

a. Bleeder trip check valve closing times and extraction steam line drain valve opening times are acceptable. (Section 10.2.2.4)

Table 14.2-4 (Cont'd)

b. Valve interlocks and logic operate properly. (Section 10.2.2.4)

c. System alarms operate properly. (Section 10.2.2.4)

(P-49.1) Residual Heat Removal System

Unit Scope -

a. 1P-49.1 (Unit 1 system components)

b. 2P-49.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate that the RHR system delivers cooling water for each of the following system modes of operation: shutdown cooling, LPCI, suppression pool cooling, and fuel pool cooling.

Prerequisites - To the extent necessary to perform this test, construction is completed, instrumentation and controls are operable and calibrated, and testing of relief and safety valves is completed. The RPV is available and filled with water above the minimum level required to provide suction to the RHR pumps. The recirculation loops are complete to the extent required for system operation in the shutdown cooling mode. The ESW system is available to provide cooling water to the RHR pumps. The suppression pool is available and filled above the low water level to provide suction to the RHR pumps. The fuel pool and fuel pool skimmer surge tanks are full of water and available for fuel pool cooling mode operation.

Test Method - The operating modes of the RHR system are initiated manually from the control room and remote shutdown panel and, where applicable, automatically. RHR pump performance is determined for each mode. System flow paths are verified. The containment spray flow path is demonstrated by an air flow test that overlaps with the pump water flow path. Adequate NPSH and absence of vortexing is verified by testing the pumps at the lowest suppression pool level allowed by the Technical Specifications (Unit 1), or by testing the pumps at approximately the lowest level that will be reached by the suppression pool during the course of a LOCA while the pumps are operating (Unit 2). System controls and alarms are actuated. Watertight door gaskets and dogs are inspected and operated. Room flood detectors are operated.

Acceptance Criteria -

a. RHR pumps meet acceptable values of head and flow for system operating modes. (Sections 6.3.2.2.4 and 5.4.7)

b. System valves are operable from the control room, and all key-locks operate properly. (Sections 6.3.2.2.4 and 5.4.7)

c. The system operates properly to provide supplemental fuel pool cooling. (Sections 6.3.2.2.4 and 5.4.7)

d. The system operates properly in the shutdown cooling mode. (Sections 6.3.2.2.4 and 5.4.7)

Table 14.2-4 (Cont'd)

e. The system operates properly in the suppression pool cooling mode. (Section 7.2.1.1.5)

f. The system operates properly in the LPCI mode. (Section 7.3.1.1.4)

g. Steam condensing valves and logic operate properly. (Sections 6.3.2.2.4 and 5.4.7)

h. Containment spray valves and logic operate properly. (Section 7.3.1.1.4)

i. The RHR room flood detector operates properly. (Sections 6.3.2.2.4 and 5.4.7)

j. System alarms operate properly. (Sections 6.3.2.2.4 and 5.4.7)

k. The condensate transfer system and the safeguard piping fill pumps are each capable of maintaining full RHR pump discharge lines. (Section 6.3.2.2.6)

l. Remote shutdown panel instrumentation and controls operate properly. (Sections 6.3.2.2.4 and 5.4.7)

m. System overpressure protection interlocks operate properly. (Sections 6.3.2.2.4 and 5.4.7)

n. NPSH is within specified limits, and no vortexing is present. (Section 6.3.2.2.5)

o. Watertight doors exhibit a full seal when dogged down. (Vendor Technical Specification)

(P-50.1) Reactor Core Isolation Cooling System

Unit Scope -

a. 1P-50.1 (Unit 1 system components)

b. 2P-50.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the operability of the RCIC system in delivering water to the reactor vessel and to verify proper separation of the RCIC dc components by observing the effect of disconnecting the RCIC dc bus on RCIC operation.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The CST and suppression pool are filled above the low water level to provide suction to the pump, and auxiliary steam is available to supply steam to the RCIC pump-turbine driver.

Test Method - RCIC system operation is initiated from the control room and remote shutdown panel by manual and automatic start signals. Pump and turbine performance is verified. System controls and alarms are actuated. During system testing, the RCIC dc bus will be disconnected to verify inoperability of the RCIC system. Adequate NPSH and absence of vortexing is verified by testing the pumps at the lowest suppression pool level allowed by the Technical Specifications (Unit 1), or

Table 14.2-4 (Cont'd)

by testing the pumps at approximately the lowest level that will be reached by the suppression pool during the course of a LOCA while the pumps are operating (Unit 2).

Watertight door gaskets and dogs are inspected and operated. Room flood detectors are operated.

Acceptance Criteria -

a. The RCIC turbine controls and logic operate properly. (Sections 5.4.6 and 7.4.1.1)

b. The RCIC pump and turbine operate properly using their auxiliary steam supply. (Sections 5.4.6 and 7.4.1.1)

c. System manual and automatic initiation logic operate properly. (Sections 5.4.6 and 7.4.1.1)

d. The RCIC room flood detector operates properly. (Sections 5.4.6 and 7.4.1.1)

e. System alarms operate properly. (Sections 5.4.6 and 7.4.1.1)

f. Securing of the RCIC dc bus results in inoperability of the RCIC system. (Sections 5.4.6 and 7.4.1.1)

g. Remote shutdown panel instrumentation and controls operate properly. (Sections 5.4.6 and 7.4.1.1)

h. NPSH is within specified limits, and no vortexing is present. (Sections 5.4.6 and 7.4.1.1)

i. Watertight doors exhibit a full seal when dogged down. (Vendor Technical Specification)

Full flow and minimum start time criteria are not demonstrated until nuclear steam is available during the power test program.

(P-51.1) Core Spray System

Unit Scope -

a. 1P-51.1 (Unit 1 system components)

b. 2P-51.1 (Unit 2 system components)

Test Objectives - The test objective is to demonstrate the ability of the core spray system to deliver water spray to the reactor core.

Table 14.2-4 (Cont'd)

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The CST and the suppression pool are filled above the low water level. The RPV head is off, and the vessel is available to receive water from the core spray system.

Test Method - Core spray system operation is initiated and pump flow rates are measured in the various design modes of operation. System performance is verified. System controls and alarms are actuated. The safeguard piping fill system is operated and safeguard piping leakage is monitored. Adequate NPSH and absence of vortexing is verified by testing the pumps at the lowest suppression pool level allowed by the Technical Specifications (Unit 1), or by testing the pumps at approximately the lowest level that will be reached by the suppression pool during the course of a LOCA while the pumps are operating (Unit 2).

Acceptance Criteria -

a. The core spray pumps meet acceptable head and flow values. (Sections 6.3.2.2.3 and 7.3.1.1.1)

b. System manual and automatic initiation is acceptable. (Sections 6.3.2.2.3 and 7.3.1.1.1)

c. System MOVs operate properly. (Sections 6.3.2.2.3 and 7.3.1.1.1)

d. The core spray room flood detector operates properly. (Sections 6.3.2.2.3 and 7.3.1.1.1)

e. Systems alarms operate properly. (Sections 6.3.2.2.3 and 7.3.1.1.1)

f. Safeguard piping fill pumps operate properly and keep core spray discharge piping full. (Sections 6.3.2.2.3 and 7.3.1.1.1)

g. The condensate transfer system is capable of maintaining full core spray discharge lines. (Sections 6.3.2.2.3 and 7.3.1.1.1.3)

h. Total leakage from all safeguard piping fed by the safeguard piping fill pumps does not exceed the capability of the fill pumps. (Sections 6.3.2.2.3 and 7.3.1.1.1.3)

i. Core spray flow rates from the suppression pool to the reactor vessel are set to meet acceptance criteria by adjusting the size of the spray line discharge orifice. (Sections 6.3.2.2.3 and 7.3.1.1.1.3)

Table 14.2-4 (Cont'd)

j. System overpressure protection interlocks operate properly. (Sections 6.3.2.2.3 and 7.3.1.1.1.3)

k. NPSH is within specified limits, and no vortexing is present. (Sections 6.3.2.2.3 and 7.3.1.1.1.3)

(P-52.1) High Pressure Coolant Injection System

Unit Scope -

a. 1P-52.1 (Unit 1 system components)

b. 2P-52.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate that the HPCI system delivers cooling water to the RPV as designed.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The CST and the suppression pool are filled above the low water level to provide suction to the pump. The auxiliary boiler is available to provide steam to the HPCI pump-turbine driver.

Test Method - With the HPCI pumps uncoupled, performance of the turbine driver is measured, including operation of the turbine control and trip system. Limited pump operation (coupled) is conducted for all modes of operation (to the extent possible using auxiliary steam). System performance is determined. System controls and alarms are actuated. Adequate NPSH and absence of vortexing is verified by testing the pumps at the lowest suppression pool level allowed by the Technical Specifications (Unit 1), or by testing the pumps at approximately the lowest level that will be reached by the suppression pool during the course of a LOCA while the pumps are operating (Unit 2). Watertight door gaskets and dogs are inspected and operated. Room flood detectors are operated.

Acceptance Criteria -

a. The HPCI turbine controls and logic operate properly. (Sections 6.3.1.2.1 and 7.3.1.1.1.1)

b. The HPCI pump and turbine operate properly using the auxiliary steam supply. (Sections 6.3.1.2.1 and 7.3.1.1.1.1)

c. System automatic start, shutdown, and restart occur properly. (Sections 6.3.1.2.1 and 7.3.1.1.1.1)

d. Manual operation of system components is acceptable. (Sections 6.3.1.2.1 and 7.3.1.1.1.1)

e. Controls affecting the transfer of HPCI pump suction water supplies operate properly. (Sections 6.3.1.2.1 and 7.3.1.1.1.1)

Table 14.2-4 (Cont'd)

f. The HPCI room flood detector operates properly. (Sections 6.3.1.2.1 and 7.3.1.1.1.1)

g. System alarms operate properly. (Sections 6.3.1.2.1 and 7.3.1.1.1.1)

h. The condensate transfer system and a safeguard piping fill pump are each capable of maintaining a full HPCI pump discharge line. (Sections 6.3.1.2.1 and 7.3.1.1.1.1)

i. NPSH is within specified limits, and no vortexing is present. (Sections 6.3.2.2.1.1 and 6.3.2.2.1.2)

j. Watertight doors exhibit a full seal when dogged down. (Vendor Technical Specification)

Full flow and minimum start time criteria are not demonstrated until nuclear steam is available during the startup test program.

(P-53.1) Standby Liquid Control System

Unit Scope -

a. 1P-53.1 (Unit 1 system components)

b. 2P-53.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the proper operation of the SLCS.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The RPV is available for demineralized water injection. The SLCS tank is filled with demineralized water.

Test Method - The SLCS is manually placed in operation to the reactor in conjunction with the test firing of each squib operated valve. System performance is determined, including pump flow rates and tank heater operation. System controls and alarms are actuated.

Acceptance Criteria -

a. The standby liquid pumps meet acceptable values of flow and discharge pressure. (Section 3.9.3.1.12)

b. The standby liquid control tank temperature is controlled properly. (Section 9.3.5)

c. System manual initiation operates properly. (Section 9.3.5)

d. System automatic initiation operates properly. (Sections 7.4.1.2.3.2 and 7.6.1.8.3.4)

e. System alarms operate properly. (Section 9.3.5)

f. For each train, the connected explosive valve opens. (Section 9.3.5)

Table 14.2-4 (Cont'd)

(P-54.1) Emergency Service Water System

Unit Scope -

a. 1P-54.1 (Unit 1 system components)

b. 2P-54.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate that the ESW system supplies cooling water to safeguard equipment as designed.

Prerequisites - To the extent necessary for performance of this test, construction is completed, and instrumentation and controls are operable and calibrated. The cooling tower basin is operable, and the spray pond is at its normal operating level to provide water for the ESW pumps. The heat exchangers served by this system are available to provide a flow path for the pumps. Applicable portions of the RHRSW system are operable to support the flow verification test.

Test Method - The ESW system pumps are started manually and automatically. System controls in the control room and the remote shutdown station are operated and pump flow rates are measured. System alarms are also actuated.

Acceptance Criteria -

a. System pumps meet acceptable head and flow values for the various design flow paths. (Sections 9.2.2 and 7.3.1.1.11)

b. System pump automatic start features operate properly. (Sections 9.2.2 and 7.3.1.1.11)

c. System valves, controls and instrumentation are operable from both the control room and the remote shutdown panel; all key-locks and valve automatic features operate properly. (Sections 9.2.2 and 7.3.1.1.11)

d. System alarms operate properly. (Sections 9.2.2 and 7.3.1.1.11)

(P-55.1) Control Rod Drive Hydraulic System

Unit Scope -

a. 1P-55.1 (Unit 1 system components)

b. 2P-55.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the proper operation of the CRD hydraulic system, including CRD mechanisms, HCUs, power supply, instrumentation, and controls.

Table 14.2-4 (Cont'd)

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The condensate transfer and storage system, and the RMCS are available and operational to support the system test. The TECW system is available and operational to provide the cooling water requirement of the drive water pumps. The compressed air system is available and operational to provide the instrument air requirements of the system.

Test Method - The CRD hydraulic system is placed in operation utilizing the flow and pressure control stations. Pump controls are operated and flow rates measured. CRDs are exercised to verify latching, position indication, and stroke speeds. Scram times are measured for each control rod.

Acceptance Criteria -

a. The CRD hydraulic supply and discharge sections supply water at acceptable flow and pressure to the HCUs. (Sections 4.6.1 and 4.6.3)

b. Each HCU operates properly to drive its control rod at proper speeds. (Sections 4.6.1 and 4.6.3)

c. Position indication and latching operate properly. (Sections 4.6.1 and 4.6.3)

d. System alarms operate properly. (Sections 4.6.1 and 4.6.3)

(P-56.1) Reactor Manual Control System

Unit Scope -

a. 1P-56.1 (Unit 1 system components)

b. 2P-56.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate proper operation of the RMCS, including relays, control circuitry, switches, rod blocks, indicating lights, and control valves; and proper operation of the RWM system.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - System integrated operation is initiated manually. Controls are operated, and simulated signals are applied to verify: rod blocks; alarms and interlocks and control functions of the reactor mode switch; operation of the rod position information system and rod drift alarm circuit; and directional control valve time sequence for insert and withdraw commands. Proper operation of the RWM system is verified.

Table 14.2-4 (Cont'd)

Acceptance Criteria -

a. The system operates properly during both insert and withdrawal cycles. (Section 7.7.1.2)

b. Rod block functions, interlocks, bypasses, and indications are acceptable. (Section 7.7.1.2)

c. Rod position indication operate properly. (Section 7.7.1.2)

d. System alarms operate properly. (Section 7.7.1.2)

(P-57.1) Uninterruptible Ac Power System

Unit Scope -

a. 1P-57.1 (Unit 1 system components)

b. 2P-57.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the proper operation of the uninterruptible ac power system.

Prerequisites - To the extent necessary to perform this test, construction is completed and instrumentation and controls are operable and calibrated. The 250 V dc and 440 V motor control center buses are available for energization of the 120 V or 120/240 V uninterruptible ac distribution panel.

Test Method - The 120 V or 120/240 V uninterruptible ac distribution panels are energized from the 250 V dc power system and transfer to the 440 V ac power system is initiated. Other system controls and alarms are also actuated.

Acceptance Criteria -

a. System static inverters operate properly while supplying a design value of load. (Vendor Technical Manual)

b. System static inverter transfer time between alternate and preferred sources is acceptable. (Section 7.2.1.1.3)

c. System 440 V ac and 125/250 V dc breakers operate properly. (Vendor Technical Manual)

d. System bus voltages are acceptable. (Vendor Technical Manual)

e. System ac electrical power is available to all system distribution panels. (Electrical Single-Line Diagram)

Table 14.2-4 (Cont'd)

(P-58.1) Reactor Protection System

Unit Scope -

a. 1P-58.1 (Unit 1 system components)

b. 2P-58.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate that the RPS operates properly during integrated system functions.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - The various RPS sensors, sensor relays and devices will be actuated and timed to designated points along the scram chain logic. RPS response measurements will be run twice for each channel. The plant operating technical specification trip setpoints will be demonstrated at least one time by actual application of an input to the sensor/device or stroking an associated valve to actuate position switches as appropriate.

Acceptance Criteria -

a. System input scram function signals cause trips within design values. (Section 7.2)

b. System actuated logics operate properly. (Section 7.2).

c. Scram modes and bypasses operate properly. (Section 7.2)

d. Response time of the scram chain from sensor actuation through initiating logic and 90% rod insertion is within design values. (Section 7.2)

e. System indicators and alarms operate properly. (Section 7.2)

(P-58.2) Redundant Reactivity Control System for ATWS

Unit Scope -

a. 1P-58.2 (Unit 1 system components)

b. 2P-58.2 (Unit 2 system components)

Test Objective - The test objective is to demonstrate proper operation of the RRCS logic and to verify proper response in those systems it affects.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are calibrated and operable. The following systems are available for operation: SLCS, RWCU, CRD, reactor recirculation, APRMs, and feedwater. The reactor vessel, CST, and suppression pool are filled with demineralized water.

Table 14.2-4 (Cont'd)

Test Method - The ATWS logic is operated manually and also automatically by using simulated reactor vessel water level and steam dome pressure signals. APRM power level will also be simulated. Where appropriate, signals from the RPS will be inhibited to allow independent demonstration and redundancy verification of ATWS logic and results. Resultant actions of recirculation pump trip, alternate rod insertion, RWCU isolation and standby liquid control start will be verified. Manual operation or operating limit reset of a system while under the influence of an ATWS logic signal will be demonstrated as appropriate.

Acceptance Criteria -

a. System sensing devices, trip systems, and actuator logics operate and trip within design limits. (Section 7.6.1.8)

b. System alarms and indications operate properly. (Section 7.6.1.8)

c. System logic and its action on other systems is independent and redundant. (Section 7.6.1.8)

(P-59.1) Containment Isolation and Nuclear Steam Supply Shutoff System

Unit Scope -

a. 1P-59.1 (Unit 1 system components)

b. 2P-59.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate that the primary containment isolation and NSSSS actuates the isolation valves following simulated primary containment isolation signals.

Prerequisites - To the extent necessary to perform this test, construction is completed and instrumentation and controls are operable and calibrated. Isolation valves actuator trip relays are placed in untripped condition. Primary containment isolation valves are operable.

Test Method - The actuator trip relay for each isolation valve is operated using simulated signals as necessary to create a trip condition. The actuator trip relay then operates the corresponding isolation valve. System alarms are also actuated.

Acceptance Criteria -

a. System sensing devices, trip systems, and actuator logics operate and trip within design limits. (Section 7.3.1.1.2)

b. Closing times for valves closed by this system are within acceptable values. (Section 6.2.4)

c. System alarms operate properly.

Table 14.2-4 (Cont'd)

(P-59.2) Primary Containment Integrated Leak Rate Test

Unit Scope -

a. 1P-59.2 (Unit 1 system components)

b. 2P-59.2 (Unit 2 system components)

Test Objective - The test objective is to determine the leakage rate in the primary containment at the peak calculated accident pressure and to determine the bypass leakage from the drywell to the wetwell at the peak drywell to wetwell differential pressure and reduced differential pressure corresponding to approximately the submergence of the vents. In addition, the test will verify the proper connection and tracking of the containment pressure instruments.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The Type B and C testing has been completed in accordance with Chapters 6 and 16. The integrated leakage rate measurement system is calibrated and operational. All containment pressure instruments have been calibrated and are valved into service.

Test Method - The containment is pressurized, and the absolute pressure, dry-bulb temperature, and dew point temperature (water vapor pressure) within the containment and the drywell are recorded to determine the leak rate. The containment is depressurized, the drywell is pressurized to reduced test pressure, and data are taken to determine the drywell bypass leakage rate. As containment pressure is increased during the containment ILRT, proper tracking of all containment pressure instruments is verified.

Acceptance Criteria -

The primary containment and drywell bypass leakage rates are within acceptable limits (Section 6.2.6). All containment instruments track properly, and all affected instrument lines are clear of obstructions.

(P-59.3) Suppression Pool, Pool Cleanup and Vacuum Relief

Unit Scope -

a. 1P-59.3 (Unit 1 system components)

b. 2P-59.3 (Unit 2 system components)

Test Objectives - The test objective is to demonstrate the operability of the suppression pool cleanup and vacuum relief system, the suppression pool level instruments, and system valves.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The suppression pool is sufficiently full of water and the condenser hotwell is available.

Table 14.2-4 (Cont'd)

Test Method - The suppression pool cleanup system is operated, and the pump flow rate measured. The suppression pool level is varied, and the operability of the pool level instruments is verified. Primary containment vacuum relief valves and pressure instruments are also operated.

Acceptance Criteria -

a. The suppression pool cleanup pump meets acceptable head and flow values. (Vendor Technical Specification)

b. Primary containment vacuum relief valves operate properly. (Section 7.3.2.6.1.1)

c. System MOVs operate properly. (Section 6.4.2)

d. Suppression pool level instruments operate properly. (Section 7.5.1.4.2.1)

e. System alarms operate properly. (Section 6.3.2.2.3)

f. Containment pressure indicators used to track accident conditions operate properly. (Section 7.5.1.4.2.1)

(P-60.1) Drywell HVAC System

Unit Scope -

a. 1P-60.1 (Unit 1 system components)

b. 2P-60.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the operability of the primary containment ventilation system.

Prerequisites - To the extent necessary to perform this test, construction is completed, instrumentation and controls are operable and calibrated, chilled water flow balancing and drywell air balancing are complete.

Test Method - The ventilation system fans and chillers are operated. Controls and alarms are actuated.

Acceptance Criteria -

a. Drywell unit coolers and fans operate properly. (Section 9.4.5.2)

b. Drywell chilled water circulation pumps operate properly. (Section 9.2.10.1)

c. Drywell water chillers operate properly. (Section 9.2.10.1)

Table 14.2-4 (Cont'd)

d. System isolation and control valves operate properly. (Sections 9.2.10.1 and 9.4.5.2)

e. System alarms operate properly. (Sections 9.2.10.1 and 9.4.5.2)

(P-61.1) Reactor Water Cleanup System

Unit Scope -

a. 1P-61.1 (Unit 1 system components)

b. 2P-61.1 (Unit 2 system components)

Test Objective - The test objectives is to demonstrate the operability of the RWCU system and to verify that the system functions properly.

Prerequisites - To the extent necessary for performance of this test, construction is completed, and instrumentation and controls are operable and calibrated. The demineralizers are precoated, as required, and ready to process system flow. The RECW system is available to satisfy the system's cooling requirements.

Test Method - The recirculation pumps are operated and their performance characteristics are determined. Data are obtained during demineralizer cleanup, backwash, and precoat operations. System controls and alarms are actuated, including operation of the system isolation valves. Simulated signals are used as required.

Acceptance Criteria -

a. System pumps meet acceptable values of head and flow. (Section 5.4.8)

b. Filter precoat and backwash cycles operate properly. (Vendor Technical Manual)

c. System isolation valves operate properly. (Section 5.4.8)

d. System flow circuits operate properly. (Section 5.4.8)

e. System alarms operate properly. (Section 5.4.8)

(P-62.1) Reactor Vessel and Auxiliaries

Unit Scope -

a. 1P-62.1 (Unit 1 system scope)

b. 2P-62.1 (Unit 2 system scope)

Table 14.2-4 (Cont'd)

Test Objective - The test objective is to detect damage, excessive wear, loose parts, or other evidence of unacceptable vibration which could result from assembly errors or undesirable deviations from the previously qualified prototype plant construction.

This test is a quality assurance measure which experimentally confirms the absence of excessive vibration of core support structures, jet pumps, lower plenum components, and other major internal structures. The test is conducted without fuel, and is not intended to be a test of fuel or incore instrument vibration. However, the specified test conditions, without fuel present, provide a level of vibration excitation of major internal structures which is at least as high as that measured in normal power operation.

Prerequisites: To the extent necessary to perform this test, all reactor internals components are installed, except:

a. The core matrix is empty; there are no fuel assemblies, incore instrumentation tubes, or neutron source rods. Control blades are withdrawn or not installed. Fuel support castings are installed.

b. The dryer assembly need not be installed.

c. One of the access hole covers on the shroud support plate must remain unwelded until after the test to provide access for inspection. A temporary closure must be provided.

The reactor vessel is closed, filled, and ready for pressurization. The recirculation pumps are operable. RHR system pumps are operable to provide necessary temperature rise. The CRD system is operable to control reactor vessel pressure. RWCU system heat exchangers are operable for temperature control.

Test Method - A visual inspection is made before and after the required 100% speed pump runs. These flow runs include 35 hours of two-loop operation and 14 hours each for loops A and B. The total run time is 63 hours. These hours may not be sequential, but they must be between the initial and final inspections.

Acceptance Criteria -

Initial and final inspection results are acceptable. (Section 3.9.2.4)

(P-64.1) Reactor Recirculation System

Unit Scope -

a. 1P-64.1 (Unit 1 system components)

b. 2P-64.1 (Unit 2 system components)

Test Objective - The test objectives are to demonstrate that the reactor recirculation system components function properly, and to demonstrate the flow performance of the system to the degree possible prior to fuel loading.

Table 14.2-4 (Cont'd)

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The RPV is available and filled with demineralized water above the minimum level required for reactor recirculation pumps operation. The RECW system and DCWS are available to provide the cooling water requirements of the pumps.

Test Method - The recirculation pumps are operated at various speeds while corresponding pump flow rate and head characteristics are determined. The system is tested by individual and group operation of the pumps, MG sets, valves and controls. System interlocks and alarms are actuated, using simulated signals as required.

Acceptance Criteria -

a. Recirculation pumps meet acceptable values of head and flow for various motor input frequencies. (Sections 5.4 and 7.7.1.3)

b. System flow instrumentation operates properly. (Sections 5.4 and 7.7.1.3)

c. Recirculation pump isolation valves operate properly. (Sections 5.4 and 7.7.1.3)

d. System alarms are operable. (Sections 5.4 and 7.7.1.3)

e. System control logic operates properly. (Sections 5.4 and 7.7.1.3)

f. MG sets operate properly. (Sections 5.4 and 7.7.1.3)

g. MG sets' lube oil system operates properly. (Sections 5.4 and 7.7.1.3)

(P-65.1) Radwaste Enclosure HVAC System

Unit Scope -

a. 1P-65.1 (Common system components)

Test Objective - The test objective is to demonstrate the ability the radwaste enclosure HVAC system to provide air flow and respond to simulated temperature variations in the radwaste enclosure, equipment compartment, service and control, and fume hood areas. Additional objectives are to demonstrate the ability of the charcoal vault cooling system to maintain temperature control in charcoal vaults 1, 2, and 3, and the ability of the radwaste enclosure HVAC system to maintain positive air flow from clean areas to areas of increasing potential contamination.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - System fans and filter units are placed in operation. System controls and interlocks are operated. The charcoal vault cooling system and controls are operated. System temperature control valves response to temperature controls are verified. System alarms are activated.

Table 14.2-4 (Cont'd)

Acceptance Criteria -

a. System supply and exhaust fans operate properly. (Section 9.4.3)

b. System temperature control valves respond to temperature controls. (Section 9.4.3)

c. Results of in-place filter efficiency testing are acceptable (Table 9.4-18).

d. Supply and exhaust fan controls and interlocks operate properly. (Section 9.4.3)

e. The charcoal vault cooling system operates properly. (Section 9.4.3)

f. Compartment differential pressures are maintained. (Section 9.4.3)

g. System alarms operate properly. (Section 9.4.3.5)

(P-66.1) Reactor Enclosure Unit Cooler System

Unit Scope -

a. 1P-66.1 (Unit 1 system components)

b. 2P-66.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the capability of the reactor enclosure unit coolers to provide air flow to the RCIC, core spray, RHR, and HPCI safeguard pump compartments.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - The unit coolers are placed in operation. Pump compartment temperature variations are simulated and system response is verified. Unit cooler component interlocks are verified. The ESW system valves are operated throughout the test. System alarms are verified under actual and simulated conditions as practicable. System parameters are monitored and recorded for systems cooling ECCS equipment.

Acceptance Criteria -

a. The unit coolers operate properly. (Section 9.4.2)

b. The unit coolers automatic start features and interlocks operate properly in both the automatic and standby modes. (Section 9.4.2)

c. The unit coolers respond properly to temperature variations within the respective pump compartments. (Section 9.4.2)

d. Cooling water central valves are operated whenever the applicable unit cooler is energized. (Section 9.4.2)

Table 14.2-4 (Cont'd)

e. System alarms operate properly. (Section 9.4.2)

(P-66.2) - Control Enclosure Unit Coolers

Unit Scope -

a. 1P-66.2 (Common system components)

Test Objective - The test objective is to demonstrate the capability of the control enclosure unit coolers to provide cooling air flow to the SGTS room and access.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Applicable portions of the HVAC air balancing test are completed.

Test Method - The unit coolers are placed in operation. SGTS room and access temperature variations are simulated and system response is verified. Unit cooler component interlocks are verified.

Acceptance Criteria -

a. The unit coolers operate properly in the RUN, AUTO, and STBY modes. (Section 9.4.1)

b. Chill water inlet valves open when their associated unit cooler fan starts. (Section 9.4.1)

c. Chill water pumps start whenever one of the unit are operable from both the control room and the remote shutdown panel; coolers they supply starts. (Section 9.4.1)

d. SGTS access dampers open when their associated unit cooler fan starts. (Section 9.4.1)

(P-68.1) Solid Radwaste System

Unit Scope -

a. 1P-68.1 (Common system components)

b. 2P-68.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the operability of the solid radwaste system including the radwaste solidification system.

Prerequisite - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Demineralized water is available.

Table 14.2-4 (Cont'd)

Test Method - The solid radwaste system is tested with actual, nonradioactive, representative waste streams, which include backwash resins from RWCU, fuel pool cleanup, and condensate cleanup. The system is tested to ensure that these representative waste streams can be processed from their respective collection tanks through the phase separators, centrifuges and drumming process. Major operations verified in the test include the ability to mix sludge/resins and water in the backwash and sludge tanks to produce transportable mixtures, use of the phase separator tanks to concentrate sludge and resins by the decanting process prior to discharging to the centrifuges and high integrity containers.

Acceptance Criteria -

a. System pumps operate properly and are able to agitate contents of tanks and to transport slurry mixtures. (Section 11.4)

b. System alarms and controls operate properly. (Section 11.4)

c. System components (e.g., centrifuges, tank agitators, transfer carts, radwaste crane, etc.) operate properly. (Section 11.4)

d. System discharge product meets free liquid content limit as identified in Chapter 11.

(P-69.1) Equipment Drain Collection and Storage System

Unit Scope -

a. 1P-69.1 (Unit 1 and common system components)

b. 2P-69.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the ability of the equipment drain system to collect, store, and transfer potentially contaminated low conductivity liquid wastes.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - System pumps are operated in both manual and automatic modes. Power-operated valves are cycled in both manual and automatic modes. System alarms are verified by using actual or simulated conditions, as practical. Containment isolation signals are initiated to verify valve interlocks. Sumps fitted with positive exhaust connections are smoke tested.

Acceptance Criteria -

a. System pumps operate satisfactorily. (Sections 9.3.3 and 11.2)

b. System pumps operate in both manual and automatic modes. (Sections 9.3.3 and 11.2)

c. System power-operated valves operate in both manual and automatic modes. (Sections 9.3.3 and 11.2)

Table 14.2-4 (Cont'd)

d. Containment isolation valve interlocks operate. (Sections 9.3.3 and 11.2)

e. Sump exhausts draw room air into sump. (Sections 9.3.3 and 11.2)

f. System alarms operate. (Sections 9.3.3 and 11.2)

(P-69.3) Liquid Radwaste System

Unit Scope -

a. 1P-69.3 (Unit 1 and common system components)

b. 2P-69.3 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the ability of the equipment drain subsystem to transfer and process potentially contaminated low conductivity liquid wastes; the flow drain subsystem to collect, transfer, and process potentially contaminated high conductivity liquid wastes; and the fuel pool filter precoat and backwash system to clean and precoat both the equipment drain and floor drain filters. In addition, the ability of the chemical waste subsystem to collect and transfer corrosive liquid wastes; and the laundry drain subsystem to collect, transfer, and process liquid detergent wastes shall be demonstrated.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. System filters have been precoated and system demineralizers have been loaded with resin.

Test Method - The liquid radwaste system is operated with representative nonradioactive waste influent. Equipment and subsystems to be tested include equipment and floor drain processing, chemical waste, and laundry drains. System pumps are operated in both manual and automatic modes. The fuel pool precoat and backwash system is operated to clean and precoat both the equipment drain and the floor drain filters. System alarms are verified by using actual or simulated conditions where practical. The effluent of each filter and demineralizer is sampled to ensure that it is of acceptable quality. Power-operated valves are cycled in both manual and automatic modes.

Acceptance Criteria -

a. System pumps operate properly. (Section 11.2)

b. System pumps operate in both manual and automatic modes. (Section 11.2)

c. Fuel pool filter precoat and backwash system cleans and precoats both the equipment drain and floor drain filters. (Section 11.2)

d. System power-operated valves operate in both manual automatic modes. (Section 11.2)

e. The equipment and floor drain subsystems produce condensate storage quality water. (Section 11.2)

Table 14.2-4 (Cont'd)

f. The laundry drain subsystem produces water of acceptable quality to discharge to the environment. (Section 11.2)

g. Contents of the chemical waste tank can be mixed and neutralized prior to discharge for processing. (Section 11.2)

h. System alarms operate properly. (Section 11.2)

(P-70.1) Standby Gas Treatment System and Reactor Enclosure Air Recirculation, Secondary Containment Isolation

Unit Scope -

a. 1P-70.1 (Unit 1 system components)

b. 2P-70.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the capability of the reactor enclosure secondary containment to isolate and of the air recirculation and standby gas treatment systems to function properly.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The reactor enclosure H&V system and the turbine enclosure vent north stack are available and operational to support the system test.

Test Method - The reactor enclosure secondary containment is isolated, the reactor enclosure air recirculation and the standby gas treatment start automatically by a simulated reactor enclosure isolation signal. The SGTS, RERS, and secondary containment isolation performance is determined by measuring secondary containment pressures, system pressures, and fan air flow rates. Systems controls and alarms are actuated.

Acceptance Criteria -

a. System fans, both singularly and in combinations, provide acceptable values of flow through the system filters. (Section 6.5.1)

b. Fan interlocks, automatic start and shutout features, and damper logic operate properly. (Sections 6.5.1, 7.3.1.1.7, and 7.3.1.1.8)

c. Results of in-place filter efficiency testing are acceptable. (Section 6.5.1)

d. System alarms operate properly. (Sections 6.5.1, 7.3.1.1.7, 7.3.1.1.8, and 7.3.1.1.9)

e. Reactor enclosure isolation logic operates properly. (Section 6.2.3)

f. The reactor enclosure ventilation system is shut down and isolated properly. (Section 6.2.3)

Table 14.2-4 (Cont'd)

g. System steam flooding damper operation is proper. (Section 9.4.2.1)

(P-72.1) Gaseous Radwaste Recombiners and Filters

Unit Scope -

a. 1P-72.1 (Unit 1 and common system components)

b. 2P-72.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the operability of the gaseous radwaste system.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Nitrogen and auxiliary steam are available as required. Service water and RECW are operable, and the turbine enclosure ventilation stack is available for discharges.

Test Method - System recombiner and charcoal treatment trains are operated and their performance is verified.

Acceptance Criteria -

a. System recombiner and charcoal treatment trains operate properly. (Section 11.3)

b. System controls and alarms operate properly. (Section 11.3)

(P-73.1) Containment Atmosphere Control System

Unit Scope -

a. 1P-73.1 (Unit 1 system components)

b. 2P-73.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the ability of the CAC system to provide accurate analysis of containment oxygen and hydrogen content and to demonstrate the operability of the hydrogen recombiner packages. The actual hydrogen/oxygen recombination process is not demonstrated at this time.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - The combustible gas analyzer packages are operated and system flow rates determined. Gas samples containing known concentrations of oxygen and hydrogen are introduced into the system to verify proper response of the gas concentration indicating and recording equipment. The hydrogen recombiner system is operated, and system flow rates determined. System controls and alarms are actuated.

Table 14.2-4 (Cont'd)

Acceptance Criteria -

a. System atmosphere control isolation valves operate properly. (Section 9.4.5.1)

b. Containment hydrogen recombiners meet acceptable values of flow and temperature. (Section 9.4.5.1)

c. System hydrogen/oxygen analyzers operate properly. (Section 9.4.5.1)

d. System alarms operate properly. (Section 9.4.5.1)

(P-76.1) Process Sampling System

Unit Scope -

a. 1P-76.1 (Unit 1 system components)

b. 2P-76.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the ability of the process sampling system to provide various process samples with adequate flow indication to installed analytical monitoring equipment and grab samples stations.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - Each sample station is operated and grab samples are drawn as available. Chemical fume hoods and the turbine enclosure sample station drain recovery tank pumps are operated. System alarms are actuated.

Acceptance Criteria -

a. Sample lines are unobstructed. (Section 9.3.2)

b. Grab sample valves operate properly. (Section 9.3.2)

c. The turbine enclosure sample station drain recovery tank pumps operate properly. (Section 9.3.2)

d. The chemical fume hoods operate properly. (Section 9.3.2)

e. System alarms operate properly. (Section 9.3.2)

(P-76.2) Postaccident Sampling System

Unit Scope -

a. 1P-76.2 (Unit 1 system components)

Table 14.2-4 (Cont'd)

b. 2P-76.2 (Unit 2 system components)

Test Objective - The objective is to demonstrate the operability of the postaccident sampling system.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The postaccident sampling system and support systems are complete and operational.

Test Method - Component control and status indication will be tested, and base line operating data will be obtained for major components. The system will be operationally checked by taking actual samples.

Acceptance Criteria -

a. System gas pumps, gas breakdown pump, and liquid chiller function properly. (Section 11.5.5)

b. Component control and status indication devices function properly. (Section 11.5.5)

c. The system is capable of obtaining process samples from all design sampling points. (Section 11.5.5)

(P-78.1) Startup Range Detector Drive Control and Neutron Monitoring System

Unit Scope -

a. 1P-78.1 (Unit 1 system components)

b. 2P-78.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the operability of the startup range neutron monitoring system which includes both source and intermediate range neutron monitoring equipment.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - Each source and intermediate range detector is positioned from its fully inserted position to its fully retracted position to demonstrate the operability of the insert/retract mechanisms. Using simulated input signals, each source and intermediate range detector loop is tested to demonstrate meter indication, trip circuit operation, retract and insert permissives, associated rod block signals, and alarm operation.

Acceptance Criteria -

a. The startup range drive system is capable of positioning each detector through its full length of travel. (Section 7.7.2.6)

Table 14.2-4 (Cont'd)

b. Startup range neutron flux level and rate circuits indicate properly. (Section 7.7.2.6)

c. Startup range trip signals operate properly. (Section 7.7.2.6)

d. Startup range selector switch logic and insert/retract permissives operate properly. (Section 7.7.2.6)

e. Startup range rod block signals are generated per design. (Section 7.7.2.6)

f. System alarms operate properly. (Section 7.7.2.6)

(P-78.2) Power Range Neutron Monitoring System [1]

Unit Scope -

a. 1P-78.2 (Unit 1 system components)

b. 2P-78.2 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the operability of LPRM and APRM systems.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - Each LPRM channel is tested using simulated signals to its tripping, alarm, or indicating function. Each APRM channel is tested for its tripping, alarm, or indicating function using simulated signals from the LPRM. Simulated recirculation flow signals are also utilized to provide the bias for varying the rod block and trip setpoints. Simulated signals are used to test the rod block monitor outputs.

[1] This information is for historical reference only.

Acceptance Criteria -

a. The local power range neutron flux circuits operate properly and are capable of providing signals to the APRM system, the RBM system, the process computer, and to LPRM system indicating meters and auxiliary devices. (Section 7.6.1.4)

b. LPRM and APRM system trip signals operate properly. (Section 7.6.1.4)

c. Average power range power level circuits operate properly. (Section 7.6.1.4)

d. System alarms operate properly. (Section 7.6.1.4)

e. Rod block monitor outputs operate. (Section 7.6.1.4)

Table 14.2-4 (Cont'd)

(P-78.3) Traversing Incore Probes Calibration System

Unit Scope -

a. 1P-78.3 (Unit 1 system components)

b. 2P-78.3 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the operability of the TIP calibration system and to verify the system functions properly.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The primary containment instrument gas is available, as required, for purging the system.

Test Method - Verification that the system operates in the manual, automatic, and hand crank modes. Indexer cross-calibration interlock, shear valve control monitor, TIP automatic detector withdrawal, containment secure and squib circuits verification, ball valve control, ball valve open interlock, and purging operations are conducted. System manual and automatic controls and alarms are actuated and the ability to override automatic functions is demonstrated.

Acceptance Criteria -

a. The automatic and manual modes function in the correct designed sequence. (Section 7.7.1.6.3)

b. System drive mechanisms, including position indication, and the drive interlocks and time delays operate properly. (Section 7.7.1.6.3)

c. System signal channels, indicators, recorders, and alarms operate properly. (Section 7.7.1.6.3)

d. The system indexing mechanism and its interlocks operate properly. (Section 7.7.1.6.3)

e. The system automatically withdraws the detectors on a containment isolation signal, after which the containment isolation valves close. (Section 7.7.1.6.3)

(P-79.1) Area Radiation Monitoring System

Unit Scope -

a. 1P-79.1 (Unit 1 system components)

b. 2P-79.1 (Unit 2 system components)

Test Objective - The test objectives are to demonstrate that the area radiation monitoring system is operable and has correct high and low and alarm settings.

Table 14.2-4 (Cont'd)

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - Verification of the area radiation monitoring system capability is demonstrated by the integrated operation of the channel trip units, local and remote alarm annunciators, lights, and recorders. The site environs radiation monitoring stations are tested for Unit 1 only, as this equipment is common to both Unit 1 and Unit 2.

Acceptance Criteria -

a. Each area radiation monitoring channel operates properly. (Section 7.7.1.10)

b. Each area radiation monitoring channel high and low trip setpoint is set properly. (Section 7.7.1.10)

c. Each monitor responds properly to its internal check source. (Section 7.7.1.10)

d. The indicator and trip units properly initiate their respective indicators, alarms, and horns. (Section 7.7.1.10)

e. Each trip circuit produces an alarm upon interruption or failure of the ac power supply. (Section 7.7.1.10)

(P-79.2) - Process Radiation Monitoring System

Unit Scope -

a. 1P-79.2 (Unit 1 system components)

b. 2P-79.2 (Unit 2 system components)

Test Objective - The test objectives are to demonstrate that the process radiation monitoring system is operable and has the capability to detect a gross release of fission products from the fuel.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - Verification of the process radiation monitoring system's capability is demonstrated by the integrated operation of the channel trip units, alarm annunciators, and lights and recorders. Test signals are fed into the monitors at the control modules.

Acceptance Criteria -

a. Each process radiation monitoring channel operates properly. (Sections 7.7.1.9 and 7.6.1.1)

b. The indicator and trip units properly operate their respective indicators and alarms. (Section 7.7.1.9)

Table 14.2-4 (Cont'd)

c. As applicable, each monitor responds properly to its secondary check source. (Section 7.7.1.9)

d. Provides trip signals to initiate a reactor shutdown and containment isolation on detection of a gross release of fission products from the fuel. (Section 7.7.1.9)

(P-80.1) Reactor Vessel Instrumentation System

Unit Scope -

a. 1P-80.1 (Unit 1 system components)

b. 2P-80.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate that the reactor non-nuclear instrumentation systems operate properly to provide trip, indication, and alarm information.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Relays that are initiated from the reactor vessel level and pressure sensors are placed in untripped condition.

Test Method - Simulated signals are introduced into the reactor non-nuclear instrument loops and proper trip, alarm, and indication outputs are verified.

Acceptance Criteria -

a. System indications and trips operate properly.
(Section 7.7.1.1)

b. System alarms operate properly. (Section 7.7.1.1)

(P-81.1) Fuel Handling System

Unit Scope -

a. 1P-81.1 (Unit 1 system components)

b. 2P-81.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate that the refueling platform and the various servicing tools can be used for their intended operations.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The RMCS, fuel pool, and the reactor cavity and core structure are available for testing. Dynamic and static load tests of fuel handling equipment are completed.

Table 14.2-4 (Cont'd)

Test Method - The fuel servicing equipment, refueling equipment, and servicing aids are operated. Their associated controls and alarms are actuated.

Acceptance Criteria -

a. The fuel preparation machines operate properly. (Section 9.1.4)

b. The refueling platform operates properly. (Section 9.1.4)

c. Refueling interlocks and logic operate properly. (Section 7.7.1.15)

d. Fuel position indicators operate properly. (Section 9.1.4)

(P-83.1) Main Steam System[(1)]

Unit Scope -

a. 1P-83.1 (Unit 1 system components)

b. 2P-83.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the proper operation of the main steam system, including the MSIVs, the leakage control system, and the ADS.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Primary containment instrument gas and instrument air are available to operate the main steam line isolation valves and SRVs.

(1) This information is for historical reference only.

Test Method - The MSIV-LCS valves, blowers, heaters, and controls are operated. System logic, valve times, and flows are verified and measured. The MSIVs are stroked and timed in their various modes. The ADS is functionally checked without lifting pressure relief valves. Other main steam system controls and alarms are actuated.

Acceptance Criteria -

a. The MSIVs stroke properly in the manual mode (fast and slow). (Section 5.4.5)

b. The MSIVs automatic closure is within acceptable times. (Section 5.4.5)

c. MSIV control logic, indications, and alarms operate properly. (Section 7.3.1.1.2)

d. The MSIV-LCS operates properly, valve times are as specified and system flows are acceptable. (Sections 6.7 and 7.3.1.1.3)

e. Nuclear system pressure relief valves control circuits operate properly. (Section 5.2.2)

f. The main steam line flow monitors operate properly. (Section 7.3.1.1.2)

Table 14.2-4 (Cont'd)

(P-83.2) Automatic Depressurization System

Unit Scope -

a. 1P-83.2 (Unit 1 system components)

b. 2P-83.2 (Unit 2 system components)

Test Objective - The test objectives are to demonstrate the operability of the ADS and to verify system response to signals from the logic channels.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - High drywell pressure and low reactor water level signals are simulated and system response to the logic channels is verified.

Acceptance Criteria -

a. ADS channel A responds properly to signals from logic channels A and E. (Section 7.3.1.1.1.2)

b. ADS channel C responds properly to signals from logic channels C and G. (Section 7.3.1.1.1.2)

c. The core spray and RHR pump permissive interlocks function properly. (Section 7.3.1.1.1.2)

d. ADS valves operate properly. (Section 5.2.2)

e. System instruments and alarms operate properly. (Section 7.3.1.1.1.2)

(P-83.3) Steam Leak Detection System

Unit Scope -

a. 1P-83.3 (Unit 1 system components)

b. 2P-83.3 (Unit 2 system components)

Test Objective - The test objective is to demonstrate that the steam leak detection system is operable and that system instruments have the correct trip and alarm setpoints.

Prerequisites - To the extent necessary to complete this test, construction is completed, and instrumentation and controls are operable and calibrated.

Table 14.2-4 (Cont'd)

Test Method - System temperature changes are simulated at the system control sensors. Capability of system instrumentation to respond to temperature changes and alarm setpoints is verified. The generation of isolation signals to the channel trip units is verified.

Acceptance Criteria -

a. System temperature monitors operate properly. (Sections 5.2.5 and 7.6.1.3)

b. System temperature alarms and temperature indicators operate properly. (Sections 5.2.5 and 7.6.1.3)

c. Steam leak detection temperature isolation signals are generated by the applicable circuitry to the NSSSS, the HPCI system, and the RCIC system. (Sections 5.2.5 and 7.6.1.3)

(P-85.1) Cathodic Protection System

Unit Scope -

a. 1P-85.1 (Unit 1 & 2 and Common system components)

Test Objective - The test objective is to demonstrate the capability of the cathodic protection system to maintain buried steel piping and structures at the design electrical potential.

Prerequisite - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - The cathodic rectifiers are operated and voltage, current, and resistance measurements are made.

Acceptance Criteria -

a. The electrical potential of buried steel piping and structures is maintained within acceptable limits. (Vendor Technical Manual)

b. The cathodic rectifiers operate properly. (Vendor Technical Manual)

(P-85.2) Freeze Protection and Heat Trace Systems

Unit Scope -

a. 1P-85.2 (Unit 1, common, and portions of Unit 2 system components

b. 2P-85.2 (Unit 2 remaining system components)

Test Objective - The test objective is to demonstrate the operability of the freeze protection and heat trace systems.

Table 14.2-4 (Cont'd)

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - Each freeze protection and heat trace system is operated. Control setpoints are varied, and system response is verified. System alarms are actuated.

Acceptance Criteria -

a. The freeze protection and heat trace systems energize and de-energize in response to the thermostatic controls. (Electrical Schematic Diagram)

b. System alarms operate properly. (Electrical Schematic Diagram)

(P-91.1) Plant Annunciator Systems

Unit Scope -

a. 1P-91.1 (Unit 1, common, and portions of Unit 2 system components

b. 2P-91.1 (Unit 2 remaining system components)

Test Objective - The test objective is to demonstrate the ability of the plant annunciator systems to provide both audible and visual indications of an alarm condition.

Prerequisites - To the extent necessary to perform this test, construction is completed and plant annunciator panels are operable.

Test Method - Annunciator panel test devices are operated. Alarm contacts are jumpered to demonstrate annunciator operability.

Acceptance Criteria -

a. The main control room annunciators operate properly. (Electrical Schematic Diagram)

b. The radwaste control room annunciators operate properly. (Electrical Schematic Diagram)

(P-93.2) Main Turbine Control System

Unit Scope -

a. 1P-93.2 (Unit 1 system components)

b. 2P-93.2 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the ability of the EHC system to operate the turbine-generator.

Table 14.2-4 (Cont'd)

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. The hydraulic fluid reservoir is filled with EHC fluid.

Test Method - The hydraulic system is placed in operation and alarms, trips, and control devices are actuated.

Acceptance Criteria -

a. Hydraulic system pressure meets acceptable values. (Vendor Technical Manual)

b. Turbine stop and bypass valves operate properly. (Vendor Technical Manual)

c. System alarms operate properly. (Sections 7.7.1.5 and 10.2)

d. System trips operate properly. (Sections 7.7.1.5 and 10.2)

(P-93.3) Main Turbine Supervisory System

Unit Scope -

a. 1P-93.3 (Unit 1 system components)

b. 2P-93.3 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the ability of the turbine supervisory system to monitor the operation of the main turbine. For Unit 1, this test also demonstrates system ability to monitor operation of the reactor feed pump-turbines. This aspect is accomplished by Test P-45.1 (Feedwater System) for Unit 2.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation is operable and calibrated.

Test Method - Signal inputs are simulated in the turbine supervisory system, and recording equipment and alarms are actuated.

Acceptance Criteria -

a. Instrumentation operates properly. (Vendor Technical Manual)

b. System alarms operate properly. (Section 10.2.5, Items a, b, c, f, h, and p)

(P-99.1) Reactor Enclosure Crane

Unit Scope -

a. 1P-99.1 (Unit 1 and Unit 2 system components)

Test Objective - The test objective is to demonstrate the capability of the reactor enclosure crane to safely move expected loads within the reactor enclosure.

Table 14.2-4 (Cont'd)

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Construction proof testing as identified in Section 9.1.5 has been completed.

Test Method - The crane is used to maintain its nominal rated load in a static position. Test loads are lifted and travel limits, as well as hoist, trolley, and bridge travel speeds, are measured. System controls and alarms are actuated.

Acceptance Criteria -

a. The crane load capacity is acceptable (Section 9.1.5)

b. Crane controls, alarms, interlocks, and limits operate properly. (Section 9.1.5)

c. Crane protective devices and interlocks operate properly. (Section 9.1.5)

d. Equipment safety devices operate properly. (Section 9.1.5)

(P-99.2) Seismographical Monitoring System

Unit Scope -

a. 1P-99.2 (Common system components)

Test Objective - The test objective is to demonstrate the ability of the seismographical monitoring system to measure and record seismic data.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated.

Test Method - Earthquake conditions are simulated by applying a physical force to the seismic sensors. Automatic system operation is verified.

Acceptance Criteria -

a. Peak acceleration recorders operate properly. (Vendor Technical Manual)

b. Strong motion accelerographs operate properly. (Vendor Technical Manual)

c. Seismic triggers operate properly. (Section 3.7.4)

d. Magnetic tape playback system operates properly. (Section 3.7.4)

e. Response spectrum analyzer operates properly. (Section 3.7.4)

f. System alarms operate properly. (Section 3.7.4)

Table 14.2-4 (Cont'd)

(P-99.3) Public Address and Evacuation System

Unit Scope -

a. 1P-99.3 (Unit 1 and Common system components)

b. 2P-99.3 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the ability of the public address system to transmit voice communication and the plant evacuation alarm and river warning systems to broadcast various alarms and prerecorded messages to selected areas.

Prerequisites - To the extent necessary to perform this test, construction is completed, and equipment is operational.

Test Method - Each public address station is operated in both the page and party line modes. Evacuation alarm and river warning signals are simulated, and system operation is verified.

Acceptance Criteria -

a. The public address system is operable from all stations in the page and party line modes. (Section 9.5.2)

b. All public address speakers operate properly. (Section 9.5.2)

c. The evacuation alarm system operates properly. (Section 9.5.2.2.4)

d. The river warning system operates properly. (Section 9.5.2.2.4)

e. The evacuation alarm system automatic transfer power switch operates properly. (Section 9.5.2.2.4)

(P-100.1) Loss of Offsite Power Test

Unit Scope -

a. 1P-100.1 (Unit 1 system components)

b. 2P-100.1 (Unit 2 system components)

Test Objective - The test objective is to demonstrate that the plant emergency systems are capable of operating as expected on an integrated basis in normal and emergency modes, and thus are ready for fuel loading.

Prerequisites - Selected preoperational tests are performed prior to or concurrent with operation of equipment for the cold functional test.

Table 14.2-4 (Cont'd)

Test Method - Plant operating procedures are utilized, to the extent practicable, to place plant emergency systems in service on an integrated basis for normal and emergency modes. The standby diesel generators are operated in all possible combinations, in response to simulated LOOP, and LOCA conditions.

The first of these tests consists of a diesel generator automatic start from standby conditions on receipt of LOCA signal with coincident LOOP. The plant emergency loads are automatically applied, and proper system response to the loading sequence is verified. This test, in conjunction with Tests P-24.1 (Standby Diesel Generator System) and P-100.4 (Standby Diesel Generator Loading), constitute the entire diesel generator preoperational test program.

Equipment parameters are allowed to stabilize for each operational combination, and any abnormal conditions are investigated. Equipment not under test is monitored to verify the absence of voltage.

Testing during the LOOP test or prerequisite tests will be performed using maximum attainable loads (given equipment operating restrictions) during the test. If full accident load conditions are not attained, recorded currents and voltages will be extrapolated and compared with design conditions. Testing during the LOOP test will be conducted using only one source of power to each bus.

Acceptance Criteria -

a. Integrated system performance, to the extent possible during the test, is acceptable. (Vendor test specification)

b. System electrical and mechanical performance is acceptable (Vendor test specification)

c. Each diesel generator operates properly during automatic load shedding and the automatic design accident loading sequence from standby conditions. Voltage and frequency remain within acceptable limits during the transients following each incremental application of load. (Section 8.3.1.1.3)

(P-100.2) Loss of Instrument Air

Unit Scope -

a. 1P-100.2 (Unit 1 and common system components)

b. 2P-100.2 (Unit 2 system components)

Test Objective - The test objective is to demonstrate the design response to a loss of instrument air accident of safety-related components supplied by the system.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. Cooling water is available to meet the requirements of the system. There are no essential plant systems operating that will be affected by performance of this test.

Table 14.2-4 (Cont'd)

Test Method - The system is placed in operation, and components to be tested are placed in their normal operation position in so far as plant conditions allow. Instrument air is shut off in a manner that would simulate an instrument air pipe break. The test is repeated to simulate a loss of instrument air by moisture freezing and plugging the main supply line. Affected components are verified to respond properly.

Acceptance Criteria -

a. Proper movement of affected components is verified. (System P&IDs)

b. Feeders or branches sustain an adequate share of the decaying air supply as required by the operational mode. (System P&IDs)

(P-100.4) Standby Diesel Generator Loading

Unit Scope -

a. 1P-100.4 (Unit 1 system and components)

b. 2P-100.4 (Unit 2 system and components)

Test Objective - The objective of this test is to demonstrate the capability of the standby diesel generators to accept the design accident loading sequence with a coincident LOOP.

Prerequisites - To the extent necessary to perform this test, construction is completed, and instrumentation and controls are operable and calibrated. ESW or temporary cooling water for Unit 2, diesel generator enclosure HVAC, 125 V dc power, fuel oil, and fire protection are available for diesel generator operation. ESF systems are available for operation during accident response testing.

Test Method - Each diesel generator is verified to automatically start and accelerate to rated speed and voltage on receipt of a simulated LOCA signal with coincident LOOP. To the extent that they are available for this test, the plant emergency loads are automatically applied, and proper system response to the loading sequence is verified. The applied loads consist of the major ESF system loads as a minimum, plus as many of the ancillary 440 V loads that are available at the time of the test, and any temporary means so that the actual demand seen by the diesel is simulated as close as practical. This test is conducted on each engine individually, immediately after the engine has been operated at full load temperature conditions for a 24 hour period. In addition, diesel generator synchronization to offsite power and load transfer is verified.

An analogous test will be conducted on each engine from standby conditions as a part of preoperational Test 1P-100.1 (Loss of Offsite Power) except that this test is conducted concurrently on each engine using the actual plant emergency loads. Proper system response to the loading sequence is also verified at this time.

Proper diesel generator and auxiliary system performance is verified during the 24 hour run. From the data taken at this time, the fuel oil storage system, the lube oil system, and the jacket water system are analytically verified to contain enough inventory to sustain each diesel generator for a 7 day period of continuous full load operation.

Table 14.2-4 (Cont'd)

This test, in conjunction with Tests P-24.1 (Standby Diesel Generator System) and P100.1 (Loss of Offsite Power) constitutes the entire individual diesel generator preoperational testing program.

Acceptance Criteria -

a. Each diesel generator is automatically started on a simulated LOCA with coincident LOOP, and reaches the required voltage and frequency within an acceptable time. (Section 8.3.1.1.3)

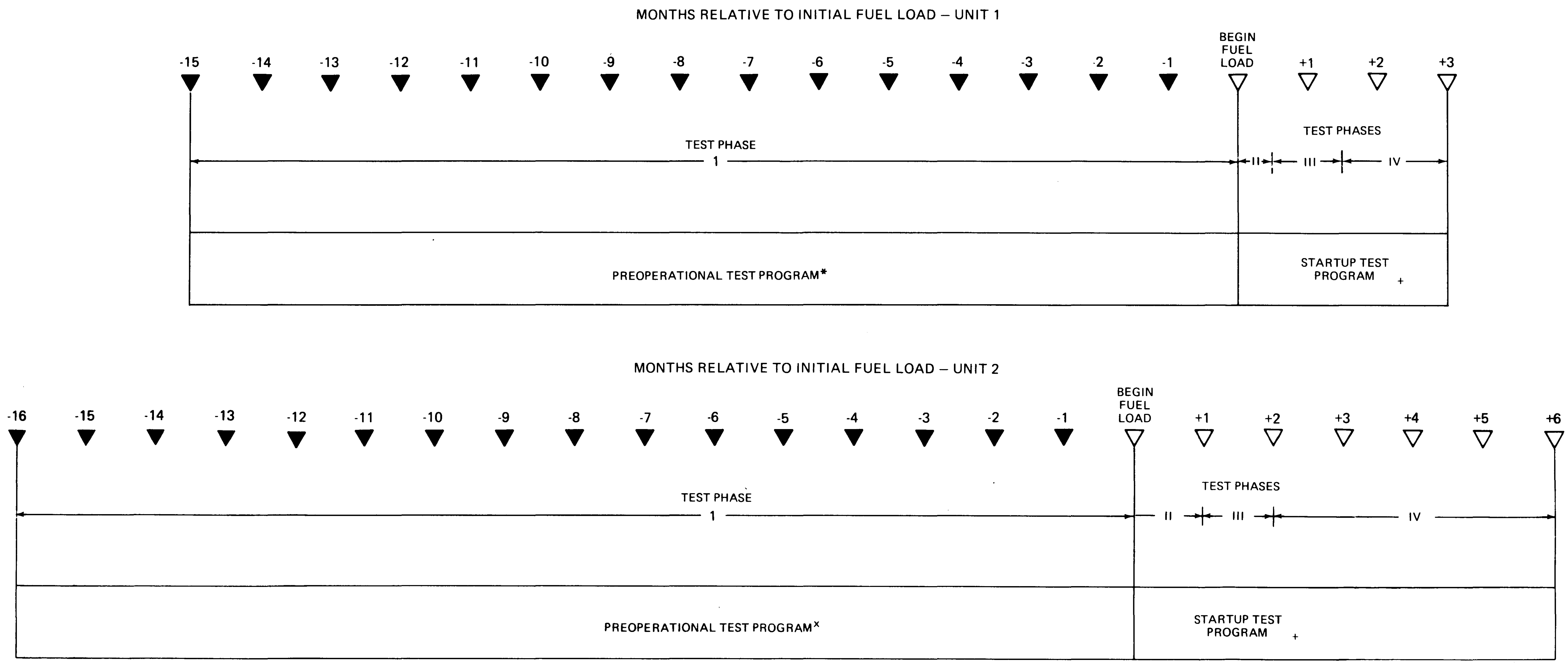
b. Each diesel generator is capable of carrying its full load for 24 hour period, the first two hours of which are at a load equivalent to the peak rating of the diesel generator (3135 kW) and the remaining 22 hours are at a load equivalent to the continuous rating of the diesel generator (2850 kW). The engine is permitted to reach temperature equilibrium prior to the application of the peak load. (Section 8.3.1.1.3)

c. Each diesel generator accepts the automatic design accident loading sequence at full load temperature conditions (immediately following the 24 hour test, above), and voltage and frequency are maintained within the required limits. The applied loads consist of the major ESF system loads as a minimum, plus as many of the 440 V auxiliary loads that are available at the time of this test, and any temporary means by which the actual demand seen by the diesel is simulated as close as practical. (Section 8.3.1.1.3)

d. Each diesel generator operates properly during load shedding, including loss of the single largest emergency load (a RHR pump). (Section 8.3.1.1.3)

e. While carrying its emergency loads, each diesel generator is capable of: (1) synchronizing with the offsite power source, (2) transferring its loads to the offsite power source, and (3) returning to standby status. (Section 8.3.1.1.3)

f. Each diesel generator auxiliary system operates properly and the fuel oil, lube oil, and jacket water systems will contain enough inventory to sustain the diesel generator for a 7 day period of continuous full load operation. (Sections 8.3.1.1.3, 9.5.4, 9.5.5, and 9.5.7)



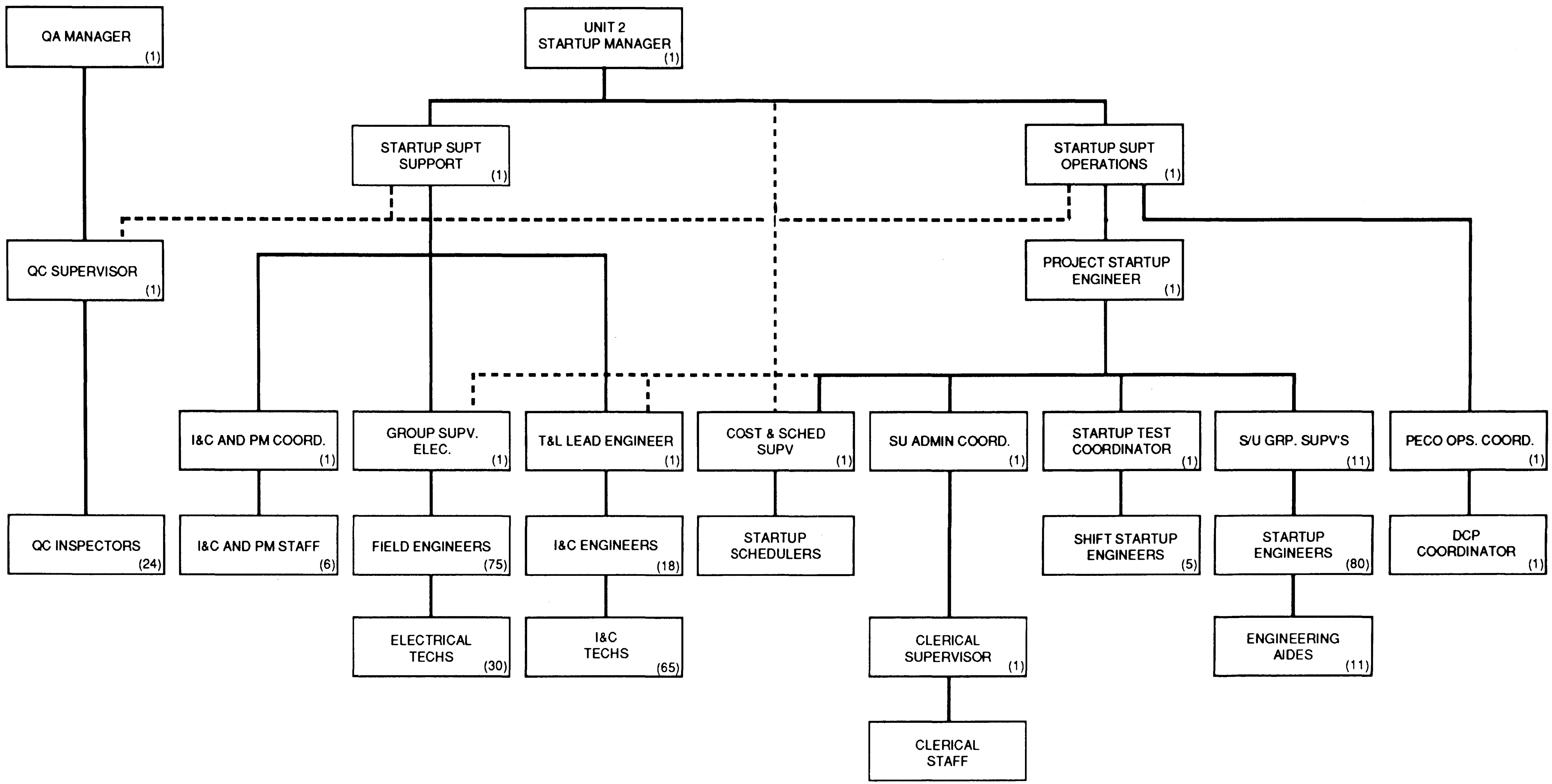
NOTES:

(*) REFERENCE FIGURE 14.2-6 FOR PREOPERATIONAL TEST SEQUENCE
(x) REFERENCE FIGURE 14.2-7 FOR PREOPERATIONAL TEST SEQUENCE
(+) REFERENCE FIGURE 14.2-5 FOR STARTUP TEST SEQUENCE

LIMERICK GENERATING STATION
UNITS 1 AND 2
UPDATED FINAL SAFETY ANALYSIS REPORT

INITIAL TEST PROGRAM SCHEDULES

FIGURE 14.2-1



LIMERICK GENERATING STATION
UNITS 1 AND 2
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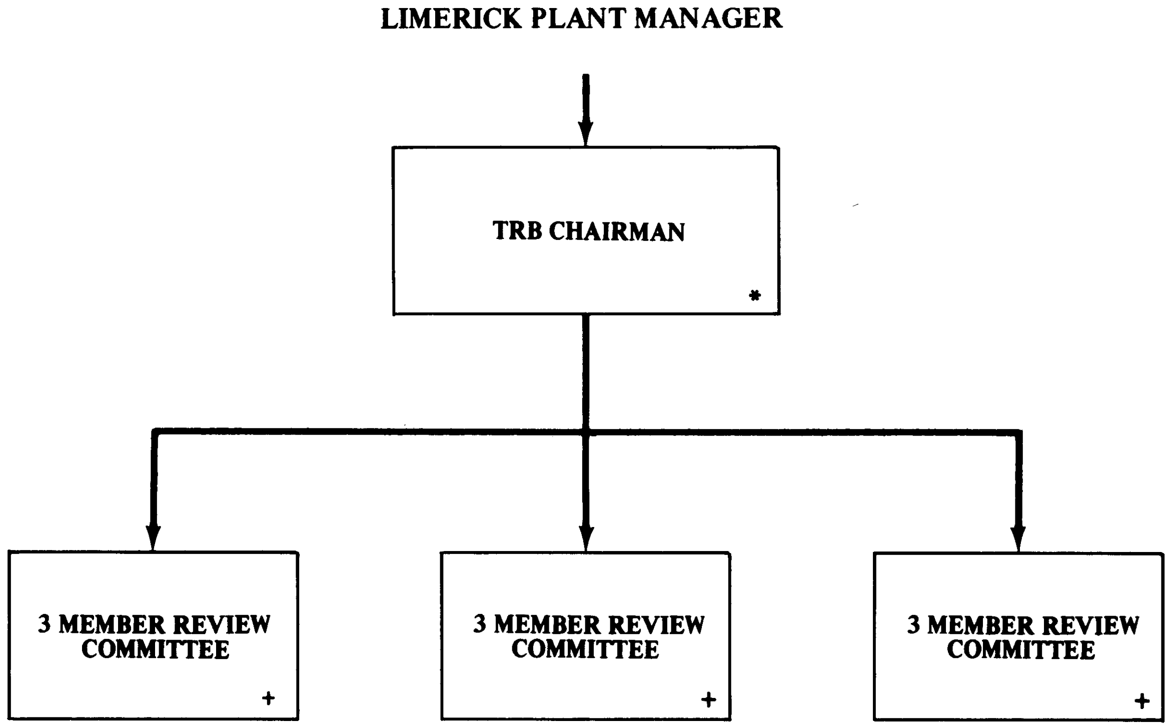
STARTUP ORGANIZATION

FIGURE 14.2-2



* PERMANENT MEMBER (MAY ALSO SERVE AS REVIEW COMMITTEE MEMBER)

\+ REVIEW MEMBERS ASSIGNED AS REQUIRED (MINIMUM OF 3 PER COMMITTEE).

THE TRB CHAIRMAN MAY SERVE AS ONE MEMBER OF A REVIEW COMMITTEE.

LIMERICK GENERATING STATION
UNITS 1 AND 2
UPDATED FINAL SAFETY ANALYSIS REPORT

TEST REVIEW BOARD ORGANIZATION

FIGURE 14.2-3

1. OBJECTIVES

2. ACCEPTANCE CRITERIA

3. REFERENCES

4. PRECAUTIONS, NOTES, AND DEFINITIONS

5. TEST EQUIPMENT

6. SYSTEM TEST

   6.1 PREREQUISITES
   6.2 TEMPORARY INSTALLATIONS
   6:3 INITIAL STATUS
   6.4 TEST INSTRUCTIONS
   6.5 RESTORATION

7. APPENDICES, FIGURES, TABLES

LIMERICK GENERATING STATION
UNITS 1 AND 2
UPDATED FINAL SAFETY ANALYSIS REPORT

TEST PROCEDURE STANDARD FORMAT
(SHEET 1 of 2)

FIGURE 14.2-4

STARTUP TEST PROCEDURE STANDARD FORMAT

STPXX.0	MAIN BODY
STPXX.0.1	OBJECTIVES
STPXX.0.2	DESCRIPTION
STPXX.0.3	ACCEPTANCE CRITERIA
STPXX.0.4	REFERENCES
STPXX.0.5	PROCEDURE
STPXX.0-A	GENERAL APPENDICES
STPXX.Y	SUBTEST
STPXX.Y.1	DISCUSSION
STPXX.Y.2	PRECAUTIONS
STPXX.Y.3	TEST EQUIPMENT
STPXX.Y.4	PREREQUISITES
STPXX.Y.5	INITIAL STATUS
STPXX.Y.6	TEST INSTRUCTIONS
STPXX.Y.7	ANALYSIS
STPXX.Y-A	SPECIFIC APPENDICES

LEGEND XX – STARTUP TEST PROCEDURE NUMBER

Y – SUBTEST NUMBER

A – APPENDIX DESIGNATOR

LIMERICK GENERATING STATION
UNITS 1 AND 2
UPDATED FINAL SAFETY ANALYSIS REPORT

TEST PROCEDURE STANDARD FORMAT
(SHEET 2 of 2)

FIGURE 14.2-4

TEST NO.	PROCEDURE DESCRIPTION	OPEN VESSEL	HEAT UP	1	2	3	4	5	6	WAR-RANT
1	CHEMICAL AND RADIOCHEMICAL	X	X	X	X	X		$X^{(6)}$	X	
2	RADIATION MEASUREMENTS	X	X		X	X			X	
3	FUEL LOADING	X								
4	FULL CORE SHUTDOWN MARGIN		$X^{(4)}$							
5	CONTROL ROD DRIVE SYSTEM	X	X		X	$X^{(11)}$			X	
6	SRM PERFORMANCE AND CONTROL ROD SEQUENCE		$X^{(4)}$							
9	WATER LEVEL REFERENCE LEG TEMPERATURE		X	X	X	X	X	X	X	
10	IRM PERFORMANCE		$X^{(4)}$	X						
11	LRPM CALIBRATION		X	X		X			X	
12	APRM CALIBRATION		X	X	X	$X^{(10)}$		X	X	X
13	PROCESS COMPUTER PERFORMANCE VERIFICATION	X	X	X	X	X			(5)	
14	RCIC SYSTEM PERFORMANCE VERIFICATION		X	X	$X^{(5,6)}$					
14.1	RCIC SYSTEM STARTUP AFTER LOSS OF AC POWER TO THE SYSTEM			$X^{(6)}$						
14.2	RCIC SYSTEM OPERATION WITH A SUSTAINED LOSS OF AC POWER TO THE SYSTEM			$X^{(6)}$						
15	HPCI SYSTEM PERFORMACE VERIFICATION		X			X				
16	SELECTED PROCESS TEMPERATURE VERIFICATION		$X^{(10)}$			X	$X^{(10)}$		$X^{(10)}$	
17	SYSTEM EXPANSION	X	X		$X^{(6)}$				$X^{(6,8)}$	
18	TIP UNCERTAINITY					X			X	
19	CORE PERFORMANCE			X	X	X	X	X	X	X
20	STEAM PRODUCTION									X
21	DELETED									
22	PRESSURE REGULATOR RESPONSE			X	X	X	$X^{(10)}$	X	X	
23	FEEDWATER CONTROL SYSTEM DEMONSTRATION			X	X	X	X	X	$X^{(5)}$	
24	MAIN TURBINE VALVES SURVEILLANCE TEST					X			$X^{(5,9)}$	
25	MAIN STEAM ISOLATION VALVES PERFORMANCE VERIFICATION		X	X		$X^{(3)}$			$X,SD^{(2,5,9,12)}$	
26	MAIN STEAM RELIEF VALVES PERFORMANCE		X		X					
27	TURBINE TRIP AND GENERATOR LOAD REJECTION DEMONSTRATION				$X^{(7)}$	$X,SD^{(2,11)}$			$X,SD^{(2)}$	
28	SHUTDOWN FROM OUTSIDE THE MAIN CONTROL ROOM DEMONSTRATION				$X,SD^{(2)}$					
29	RECIRCULATION FLOW CONTROL DEMONSTRATION					$X^{(5)}$			$X^{(5)}$	
30	RECIRCULATION SYSTEM				X	X	X		X	
31	LOSS OF TURBINE-GENERATOR AND OFFSITE POWER				X,SD					
32	ESSENTIAL HVAC SYSTEM OPERATION AND CONTAINMENT HOT PENETRATION TEMPERATURE VERIFICATION		X			X			X	
33	PIPING STEADY STATE VIBRATION		X		X	$X^{(5)}$		X	$X^{(5,6,8)}$	
34	OFFGAS SYSTEM PERFORMANCE VERIFICATION		X	X		X			$X^{(5)}$	
35	RECIRCULATION FLOW CALIBRATION					$X^{(5)}$	X	$X^{(5,6,8)}$		
36	PIPING DYNAMIC TRANSIENT (13)		X		X	X			X	
37	DELETED									
38	DELETED									
70	REACTOR WATER CLEANUP SYSTEM PERFORMANCE VERIFICATION		X							
71	RESIDUAL HEAT REMOVAL SYSTEM PERFORMANCE VERIFICATION				$X^{(6)}$				$X^{(6,8)}$	

LEGEND

X TEST INDEPENDENT OF FLOW CONTROLLER MODE

SD SCRAM DEFINITE

NOTES

(1) SEE FIGURE 14.2-9 TEST CONDITION REGION MAP

(2) PERFORM TEST 5, TIMING OF 4 SLOWEST CONTROL RODS IN CONJUNCTION WITH THESE SCRAMS

(3) FULL CLOSURE ON ONE VALVE ONLY

(4) MAY BE DONE DURING TEST CONDITION OPEN VESSEL

(5) SOME TEST DONE DURING APPROACH TO TEST CONDITION

(6) MAY BE DONE DURING AND EARLIER TEST CONDITION IF CONDITIONS WARRANT

(7) DONE WITH STEAM BYPASS CAPACITY

(8) SOME TEST DONE AFTER PLANNED TRIPS FROM POWER

(9) DETERMINE MAXIMUM POWER LEVEL TEST CAN BE PERFORMED WITHOUT CAUSING REACTOR SCRAM

(10) TEST NOT REQUIRED FOR UNIT 2

(11) TEST NOT REQUIRED FOR UNIT 2. NO TC-3 SCRAM DURING STP-27. NO. STP-5 SCRAM TIMING TEST DUE TO NO. SCRAM

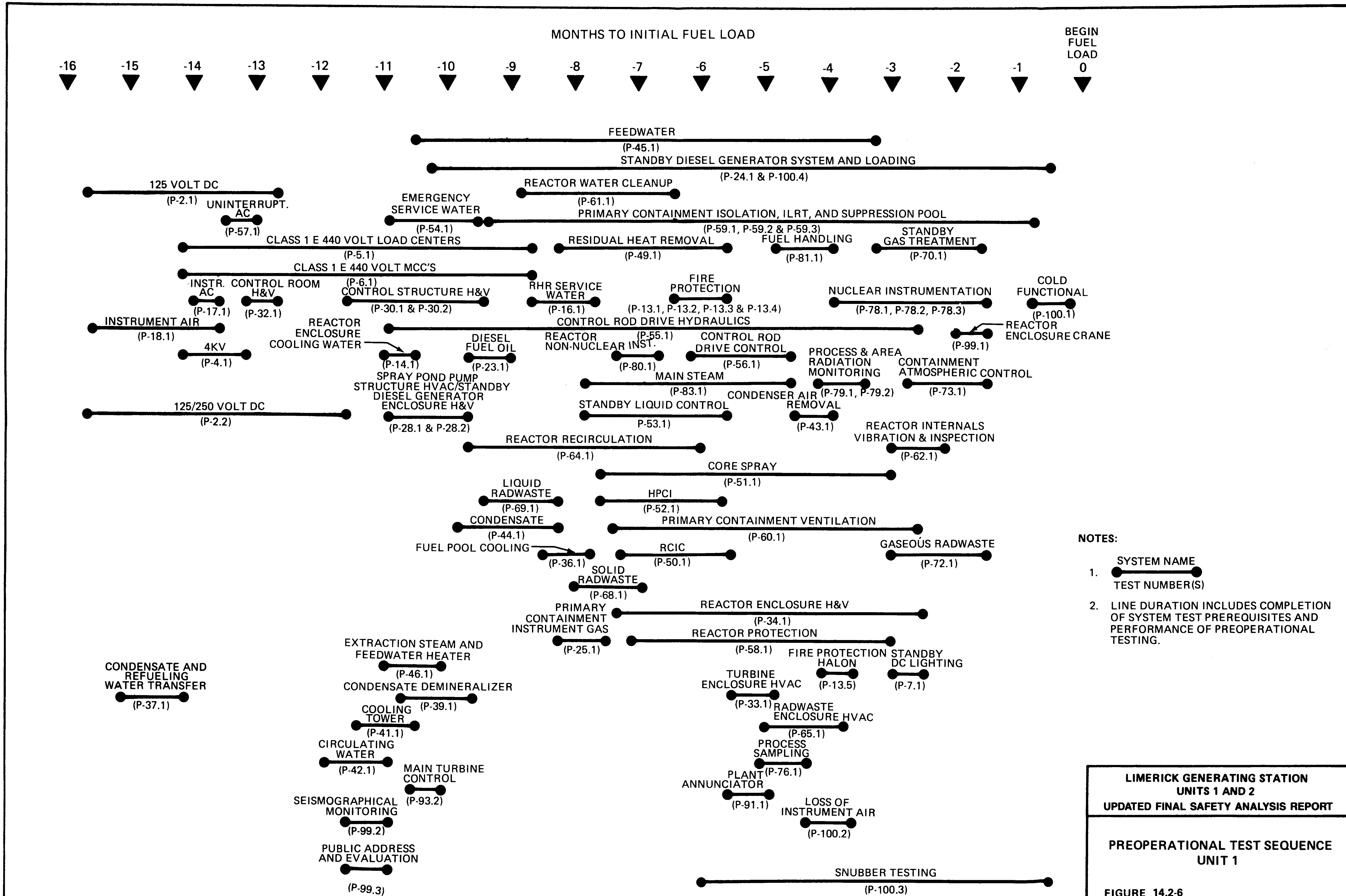
(12) FOR UNIT 2 ONLY, FULL CLOSURE OF ONE VALVE TO DETERMINE THE MAXIMUM POWER LEVEL WHICH WILL NOT CAUSE A REACTOR SCRAM WILL BE PERFORMANCE AT TEST CONDITIONS.

(13) MAIN STEAM TURBINE TRIP TEST FOR UNIT 2 (REF. STARTUP TEST STP-36) AT 100% LEVEL WILL BE PERFORMED DURING COMMERCIAL OPERATION OF THAT UNIT.

LIMERICK GENERATING STATION
UNITS 1 & 2
UPDATED FINAL SAFETY ANALYSIS REPORT

STARTUP TEST SEQUENCE
(UNITS 1 & 2)

FIGURE 14.2-5 REV. 3 NOV./93



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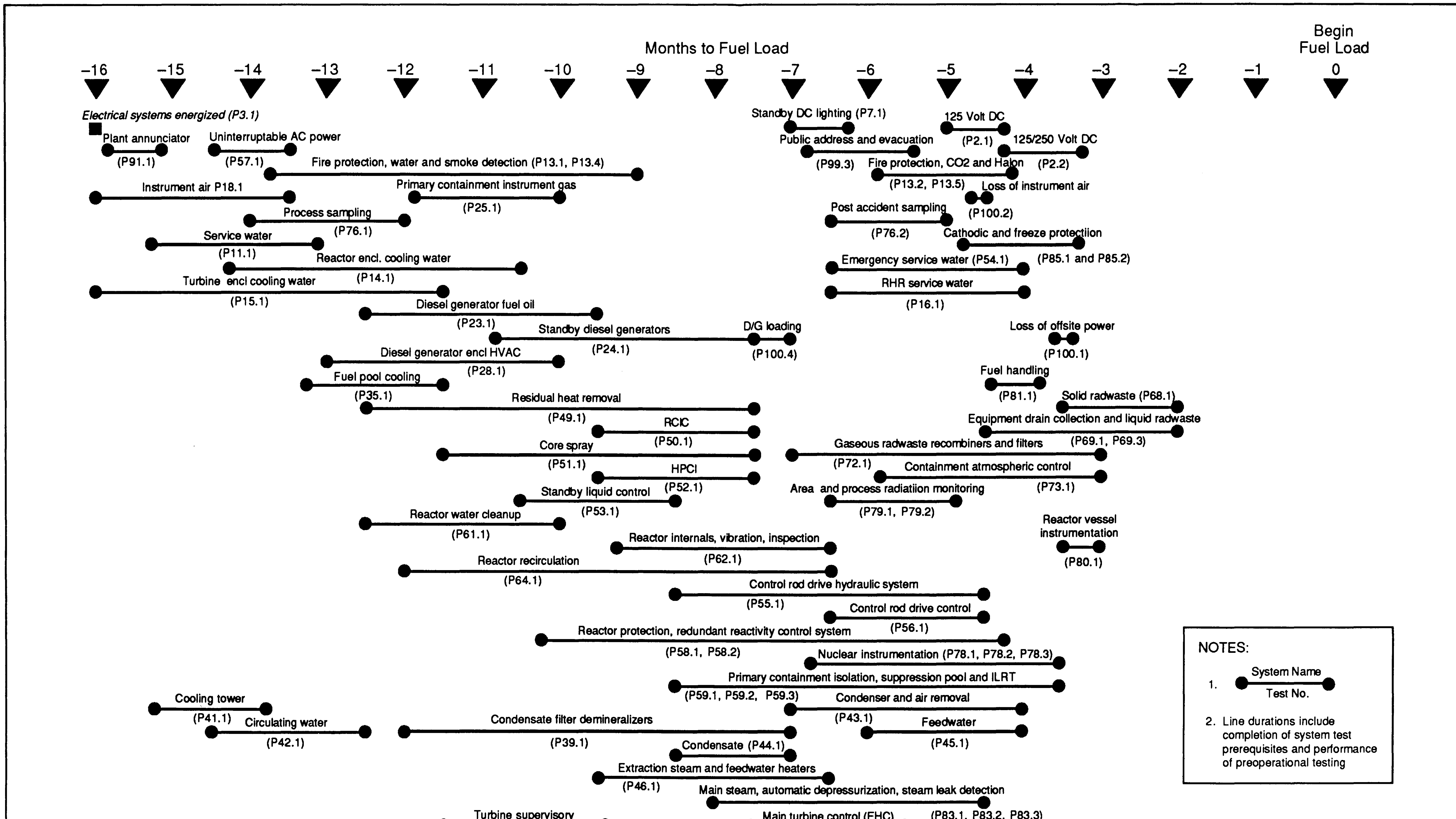
UNITS 1 AND 2
UPDATED FINAL SAFETY ANALYSIS REPORT

PREOPERATIONAL TEST SEQUENCE
UNIT 1

FIGURE 14.2-6



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UNITS 1 AND 2
UPDATED FINAL SAFETY ANALYSIS REPORT

PREOPERATIONAL TEST SEQUENCE
UNIT 2

FIGURE 14.2-7

Verified by Date

6. SYSTEM TEST

6.1 PREREQUISITES

6.1.1 SYSTEM LEVEL PREREQUISITES

6.1.1.1 SYSTEM TURNOVER

Turnover from Bechtel Construction to PECo Startup is complete. __________ __________

6.1.1.2 SYSTEM WALK THROUGH

The system has been walked through and verified complete to the extent required to conduct this test. __________ __________

6.1.1.3 HYDROSTATIC TESTING AND CLEANNESS VERIFICATIONS

Hydrostatic testing and cleanness verifications have been completed to the extent required to perform this test, and records are on file. __________ __________

6.1.1.4 STARTUP WORK LIST

The Startup Work List has been reviewed, and outstanding or closed items (if any) have been evaluated as to the effect on this test. A summary list of outstanding items is attached. __________ __________

6.1.1.5 STARTUP FIELD REPORTS

Startup Field Reports pertaining to this system have been reviewed, and outstanding or closed items (if any) have been evaluated as to their effect on this test. A summary list of outstanding items is attached. __________ __________

6.1.1.6 TEMPORARY MODIFICATIONS

The Log of Temporary Modifications has been reviewed, is current, and is satisfactory for testing. __________ __________

6.1.1.7 STARTUP WORK ORDERS AND MAINTENANCE REQUEST FORMS

Startup Work Orders and Maintenance Request Forms pertaining to this system have been reviewed, and outstanding items (if any) have been evaluated as to their effect on this test. __________ __________

TYPICAL TEST PREREQUISITES
(SHEET 1)

FIGURE 14.2-8

Verified by
Date

6.1.2 COMPONENT LEVEL PREREQUISITES

6.1.2.1 COMPONENT TECHNICAL TESTS

The required inspections and tests, as indicated in the Component Technical Test Summary, Appendix A, have been completed and verified by the responsible group. ________ ________

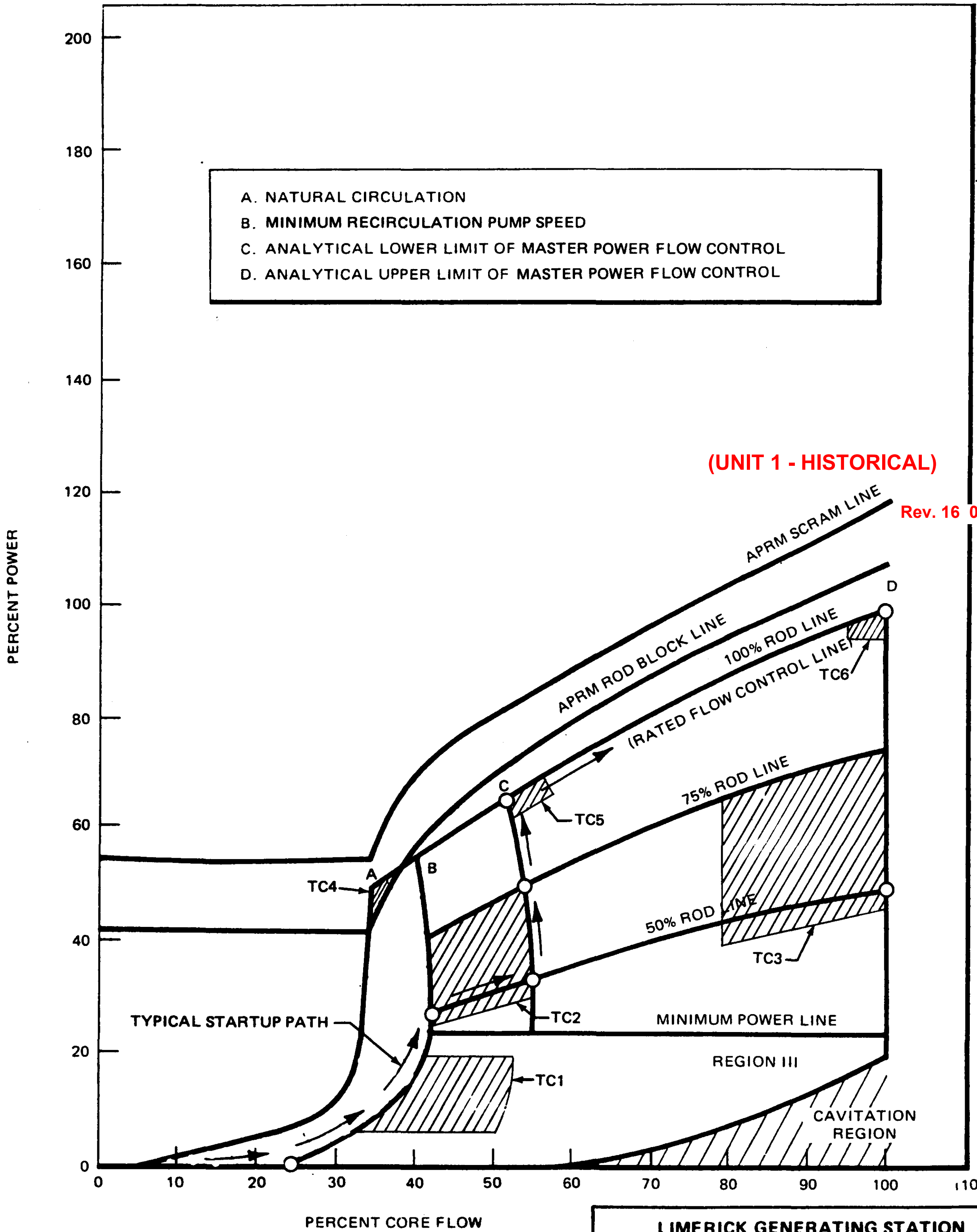
6.1.2.2 COMPONENT CALIBRATIONS

The required inspections and calibrations, as indicated in the Component Calibration Summary, Appendix B, have been completed and verified by the responsible group. ________ ________

LIMERICK GENERATING STATION
UNITS 1 AND 2
UPDATED FINAL SAFETY ANALYSIS REPORT

TYPICAL TEST PREREQUISITES
(SHEET 2)

FIGURE 14.2-8



LIMERICK GENERATING STATION
UNITS 1 AND 2
UPDATED FINAL SAFETY ANALYSIS REPORT

POWER–FLOW OPERATING MAP
(UNIT 1)
(SHEET 1 OF 4)

FIGURE 14.2-9

TEST CONDITION (TC) REGION DEFINITIONS

TEST CONDITION NO.	POWER—FLOW MAP REGION AND NOTES
1	BEFORE OR AFTER MAIN GENERATOR SYNCHRONIZATION BETWEEN 5 AND 20% THERMAL POWER-WITHIN +10, –0% OF M-G SET MINIMUM OPERATING SPEED LINE IN LOCAL MANUAL MODE.
2	AFTER MAIN GENERATOR SYNCHRONIZATION BETWEEN THE 45 AND 75% POWER ROD LINES–BETWEEN M-G SET MINIMUM SPEEDS FOR LOCAL MANUAL AND MASTER MANUAL MODES.
3	FROM 45 TO 75% CONTROL ROD LINES–CORE FLOW BETWEEN 80 AND 100% OF ITS RATED VALUE.
4	ON THE NATURAL CIRCULATION CORE FLOW LINE–WITHIN +0, –5% OF THE INTERSECTION WITH THE 100% POWER ROD LINE.
5	WITHIN +0, –5% OF THE 100% CONTROL ROD LINE–WITHIN –0, +5% OF THE ANALYTICAL LOWER LIMIT OF MASTER FLOW CONTROL.
6	WITHIN +0, –5% OF RATED 100% POWER – WITHIN +0, –5% OF RATED 100% CORE FLOW RATE.

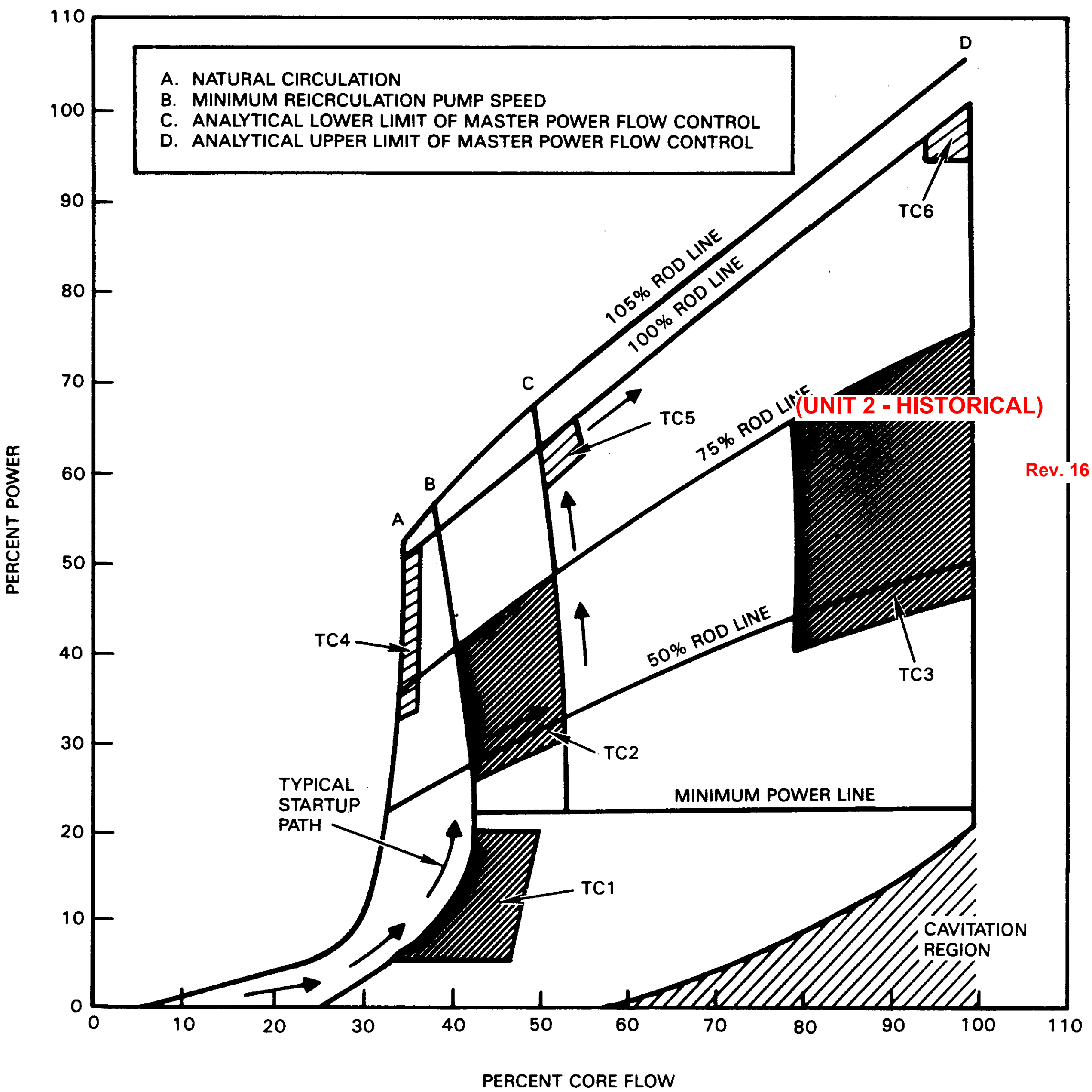
(UNIT 1 - HISTORICAL)

Rev. 16 09/12

LIMERICK GENERATING STATION
UNITS 1 AND 2
UPDATED FINAL SAFETY ANALYSIS REPORT

POWER—FLOW OPERATING MAP
(UNIT 1)
(SHEET 2 OF 4)

FIGURE 14.2-9



(UNIT 2 - HISTORICAL)

Rev. 16 09/12

LIMERICK GENERATING STATION
UNITS 1 AND 2
UPDATED FINAL SAFETY ANALYSIS REPORT

POWER—FLOW OPERATING MAP
(UNIT 2)
(SHEET 3 OF 4)

FIGURE 14.2-9

TEST CONDITION (TC) REGION DEFINITIONS

TEST CONDITION NO.	POWER—FLOW MAP REGION AND NOTES
1	BEFORE OR AFTER MAIN GENERATOR SYNCHRONIZATION BETWEEN 5 AND 20% THERMAL POWER-WITHIN +10, –0% OF M-G SET MINIMUM OPERATING SPEED LINE IN LOCAL MANUAL MODE.
2	AFTER MAIN GENERATOR SYNCHRONIZATION BETWEEN THE 45 AND 75% POWER ROD LINES BETWEEN M-G SET MINIMUM SPEEDS FOR LOCAL MANUAL AND MASTER MANUAL MODES.
3	FROM 45 TO 75% CONTROL ROD LINES—CORE FLOW BETWEEN 80 AND 100% OF ITS RATED VALUE.
4	ON THE NATURAL CIRCULATION CORE FLOW LINE—WITHIN +0, –20% OF THE INTERSECTION WITH THE 100% POWER ROD LINE.
5	WITHIN +0, –5% OF THE 100% CONTROL ROD LINE—WITHIN –0, +5% OF THE ANALYTICAL LOWER LIMIT OF MASTER FLOW CONTROL.
6	WITHIN +0, –5% OF RATED 100% POWER – WITHIN +0, –5% OF RATED 100% CORE FLOW RATE.

(UNIT 2 - HISTORICAL)

Rev. 16 09/12

LIMERICK GENERATING STATION
UNITS 1 AND 2
UPDATED FINAL SAFETY ANALYSIS REPORT

POWER—FLOW OPERATING MAP
(UNIT 2)
(SHEET 4 OF 4)

FIGURE 14.2-9