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G9.2, G9.1

Mr. George W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Knighton:

South Texas Project Electric Generating Station
Units 1 & 2
Docket Nos. STN 50-498 and STN 50-499
Draft FSAR Chapter 14.2 and
Questions 423.1 through 423.35

Recently, Houston Lighting and Power's Startup department underwent organizational changes which included a new Startup Manager. Also, changes have been incorporated into STP's design which subsequently affected the Startup Test Program. The attached rewrite of Chapter 14.2, including the preoperational and initial test summaries and the associated revised responses to NRC Questions 423.1 through 423.35, are being submitted for your review and concurrence prior to a formal amendment to the South Texas Project Electric Generating Station FSAR.

After you have reviewed the attached revision, we would like to discuss this submittal with you and your staff. We will contact our Licensing Project Manager to set a schedule for this meeting.

If you should have any questions on this matter, please contact Mr. Michael E. Powell at (713) 993-1328.

Very truly yours,

M. R. Wisenburg
Manager, Nuclear Licensing

FAW/rka
Attachment

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W2/NRC1/q

FSAR CHAPTER 14

14.2 Initial Test Program

14.2.1 Summary of Test Program and Objectives. The South Texas Project's Initial Test Program is based on the requirements of 10CFR50.34, 10CFR50 Appendix B, FSAR Chapter 17.2 - Quality Assurance Program and NRC Regulatory Guide 1.68. The program includes the period from completion of Construction and release to the HL&P Startup organization for testing through the ascension to full power.

The initial test program is designed to provide the necessary assurance that the facility can be operated in accordance with the design requirements and in a manner that will not endanger the health and safety of the public by satisfying the following objectives:

a) To provide assurance that systems perform in accordance with design.

b) To assure that plant operating and emergency procedures are proven adequate, to the extent practicable, during the performance of the program.

c) To provide adequate administrative controls to govern the program.

d) To train and familiarize plant operating and technical staff in the operation of the facility.

14.2.1.1 Test Program Categories. The Initial Test Program is divided into three categories: Prerequisite Testing, Preoperational/Acceptance Testing, and Initial Startup Testing.

a) Prerequisite Testing - Testing begins upon jurisdictional transfer (Release-for-Test) of individual components, subsystems, systems, and structures from Construction to the HL&P Startup organization. Objectives of this testing is to verify the integrity and design of components and systems and provide documented test results. Testing is conducted according to generic and specific procedures. In general, such tests are: instrument calibration, electrical component tests (megger, continuity, trip points, etc.) pump and motor rotation and vibration checks, system flushing and cleaning.

b) Preoperational Testing - Testing begins upon completion of prerequisite testing on individual safety-related subsystems/systems and includes successful completion of the preoperational tests prior to system turnover to Operations. Objectives of preoperational testing is to verify that safety related components and systems operate in accordance with design. Preoperational tests are performed on systems as the Test Summaries describe in Section 14.2.12.2.

Acceptance Testing - Testing begins upon completion of the individual non-safety related subsystem/system and includes successful completion of the acceptance testing prior to system turnover to operations. Objective of acceptance testing is to verify that components and systems are functional and can support plant operations. Acceptance tests procedure differ from preoperational test procedures in the review cycle as described in Section 14.2.3.1.

c) Initial Startup Testing - Testing begins with turnover of the system to Operations and encompasses initial core loading, criticality, zero power operation and ascension to full power.

Objectives of the initial startup test program are to verify the nuclear parameters of the reactor and plant operation while minimizing danger to the public health and safety. Initial startup testing shall also demonstrate safe and efficient operability of the plant and detect potential design deficiencies. Initial startup tests are performed as described in Section 14.2.12.3.

14.2.2 Organization and Staffing. Houston Lighting and Power Co. (HL&P) has overall responsibility for the initial test program of South Texas Project. Prerequisite and Preoperational/Acceptance testing is directed by the HL&P Startup Manager. The Nuclear Plant Operations Department (NPOD) under the direction of the HL&P Plant Manager is responsible for initial startup testing.

The HL&P Startup Organization is responsible for scheduling, performance, and documentation of Prerequisite, Preoperational/Acceptance testing, as well as providing necessary coordination and direction to various groups providing assistance to Startup.

Nuclear Plant Operations Department (NPOD) is responsible for scheduling, testing and completion of the initial startup testing as defined in Section 14.2.12.3, as well as providing the necessary coordination and direction to various groups providing assistance to NPOD.

14.2.2.1 Startup Organization. The HL&P Startup Manager has overall responsibility and commensurate authority for the performance of Prerequisite and Properational/Acceptance testing, reporting directly to the Deputy Project Manager, South Texas Project.

Responsibilities of key personnel in the HL&P Startup organization are as follows.

1. Startup Manager

   - o Manage, direct, schedule, and ensure that Prerequisite and Acceptance/ Preoperational Tests are conducted in accordance with the Startup Manual.
   - o Review and approve prerequisite, preoperational and acceptance test procedures, test procedure revisions, and test procedure results.
   - o Turnover systems to the NPOD Plant Manager.
   - o Serve as chairman of the Joint Test Group. (JTG)
   - o Approves preoperational test procedures and test results recommended by JTG members.
   - o Review and recommend approval of requests for design changes identified by Startup during testing.
   - o Review and approve Startup Administrative Instructions in the Startup Manual.
   - o Establish and implement the Startup certification, training and indoctrination program.

2. Test Group Supervisors

- o Develop requirements for component and system releases from Construction to Startup and subsequent system Turnovers to the Nuclear Plant Operations Department.
- o Accept turnover of components, subsystems/systems from Construction to Startup.
- o Direct the development of procedures for testing and collection of test data.
- o Direct the conduct of Mechanical, Electrical, or Instrument and Control testing.
- o Present preoperational test results with recommendations for approval to the Joint Test Group.
- o Assume the duties of the Startup Manager in his absence.

3. Startup Supervisors

- o Assign Startup Engineer/Technician for each test identified on assigned systems.
- o Supervise the activities of, and provide guidance to, the assigned Startup Engineers/Technicians.
- o Coordinate and supervise the preparation of test procedures.
- o Provide technical guidance and assistance in the preparation of test procedures.
- o Determine the testing requirements, sequence, and test method on assigned systems. Recommend scheduling changes as necessary to support the testing effort.
- o Review and recommend approval of test procedures and test procedure modifications. Approve or recommend approval of test results.
- o Coordinate system releases by establishing the prerequisites for, and recommend acceptance of subsystem or system releases from Construction.
- o Assume the duties and responsibilities of a Test Group Supervisors as assigned.

14.2.2.2 Nuclear Plant Operations Department. The NPOD directs the fuel loading and is responsible for the operation of the plant during initial startup testing. NPOD personnel assume responsibility for performing preventive and selected corrective maintenance activities on plant components when they are released from Construction to the Startup organization. NPOD personnel are assigned to assist Startup Engineers to operate permanent plant equipment which has been released from Construction to the Startup Organization.

The duties and responsibilities of the NPOD during plant operation are described in Chapter 13. The duties of key NPOD personnel with regard to the initial plant test program are summarized below.

1. Plant Manager

   The Plant Manager has overall responsibility for Plant Operations conducted by the Nuclear Plant Operations Department.

2. Plant Superintendent

   The Plant Superintendent has direct responsibility for initial startup testing. The Plant Superintendent or his representative is a member of the Joint Test Group (JTG) and provides liason with the JTG and the NPOD. The Plant Superintendent provides an analysis of plant schedules, operator training schedules, and operating staff workloads. The Plant Superintendent coordinates required changes to plant operating procedures based upon test results.

3. Reactor Operations Superintendent

   The Reactor Operations Superintendent is responsible for the operation of equipment in the custody of the NPOD, providing personnel from the Reactor Operations Division (as required) to support testing activities, and directing the development of plant operating procedures.

   The Shift Supervisors report to the Operations Supervisor for their respective units and are responsible for operation of the plant during assigned shifts.

4. Maintenance Superintendent

   The Maintenance Superintendent is responsible for performing preventive and corrective maintenance on components and systems released to the HL&P Startup Organization, except in cases when the Startup Manager elects to have corrective maintenance performed by others.

5. Chemical Operations and Analysis Superintendent

The Chemical Operations and Analysis Superintendent is responsible for the operation of chemical process systems and for ensuring that chemistry requirements are maintained. He will provide personnel from the Chemical Operations and Analysis Division as required to support conduct of testing activities.

6. Technical Support Superintendent

The Technical Support Superintendent provides qualified personnel to function as Test Directors for initial startup tests and other personnel from the Technical Support Division as required to support testing activities. He is also responsible for the technical direction and implementation of the initial startup testing program.

The Reactor Performance Supervisor reports to the Technical Support Superintendent and is responsible for the preparation of initial startup test procedures, supervision of activities related to the proper conduct of initial startup test, and the review of test data.

A minimum of eight NPOD engineers, directed and coordinated by the Technical Support Superintendent are involved in initial startup testing. These personnel are assisted, as necessary, by Westinghouse and HL&P Startup personnel. In addition, other NPOD personnel support initial startup testing by:

1. Preparing procedures

2. Assisting in the performance of tests.

3. Performing preventive and corrective maintenance on permanent plant equipment.

4. Operating permanently installed plant equipment for testing.

Those engineers involved in initial startup testing receive training to provide them with a knowledge of the administrative controls to which they must adhere. In addition, they are familiar with previous test activities in their area of responsibility from their review of applicable preoperational and initial startup test procedures and test results.

14.2.2.3 Bechtel Energy Corporation. BEC, under the direction of HL&P, has been designated as the Architect-Engineer and the Construction Manager of STP. As the Engineer, BEC provides a representative to serve as a member of the Joint Test Group. As the Construction Manager, BEC coordinates construction activities to support testing requirements.

14.2.2.4 Westinghouse Electric Corporation. Westinghouse Installation Services provides onsite technical assistance to HL&P during the startup testing and initial operation of the NSSS. Westinghouse onsite personnel provide technical assistance and act as technical liason with Westinghouse headquarters to resolve problems within the Westinghouse scope. The Westinghouse NSSS Site Installation Services Manager is a member of the Joint Test Group.

14.2.2.5 Other Technical Specialists. In addition to the staff described in Section 14.2.2, HL&P will augment this staff with personnel from other contractors and vendors, as necessary.

14.2.2.6 Joint Test Group. The JTG reviews and recommends for approval preoperational test procedures, revisions, and results. It is composed of the following members, as a minimum:

HL&P Startup Manager - Chairman & Approval Authority
HL&P NPOD Representative
HL&P Nuclear Engineering and Construction (NECD) Representative
BEC Engineering Representative
Westinghouse NSSS Representative

Each member of the JTG has a designated alternate with full authority to act in the absence of the member.

14.2.2.7 Plant Operations Review Committee. The Plant Operations Review Committee (PORC) reviews and recommends approval of initial startup test procedures. The membership of the PORC is described in the Technical Specifications.

14.2.2.8 Qualification. Those personnel who perform, review and evaluate activities directly related to Prerequisite, and Preoperational/Acceptance test program are qualified to perform such activities through previous experience and/or training. The qualification of these personnel conform to the requirements specified in Reg. Guide 1.58, as discussed in Table 3.12-1 of Chapter 3.

The education, training and experience requirements for those persons who conduct initial startup testing are detailed in Chapter 13, "Conduct of Operations."

14.2.3 Test Procedures

14.2.3.1 Prerequisite, Preoperational/Acceptance Test Procedures. The prerequisite and preoperational/acceptance tests are conducted utilizing detailed procedures. These procedures demonstrate, to the extent practical, the capability of components, subsystems/systems and structures to meet their design intent. These procedures are prepared under the direction of and approved by the HL&P Startup Manager.

Prerequisite testing will normally be completed prior to the start of preoperational/acceptance testing. Exceptions will be reviewed by the Startup Manager prior to proceeding with preoperational/acceptance testing.

Acceptance test procedures are prepared for non-safety related systems but are not reviewed by the Joint Test Group. Preoperational tests for safety-related systems are prepared in the format described in 14.2.3.3 and submitted to the Joint Test Group for review.

14.2.3.2 Initial Startup Test Procedures. The initial startup test procedures govern those tests performed during and following fuel loading. These include fuel loading, precriticality tests, initial criticality, low power testing, and power ascension tests that confirm design bases and anticipated plant conditions. These procedures are prepared utilizing references from appropriate design documents and technical specifications. The tests are prepared and performed under the direction of the NPOD Plant Manager.

Procedures and test results are reviewed and approval recommended by representatives of the Plant Operations Review Committee (PORC) and Westinghouse (for NSSS only). The NPOD Plant Manager is responsible for final approval of initial Startup test procedures, revisions and test results.

14.2.3.3 Procedure Format. Details for the preparation of preoperational test procedures are contained in the Startup Manual. Details for the preparation of initial startup test procedures are contained in the Plant Procedures Manual. Test procedures will contain the following information, as applicable:

1.0 OBJECTIVES. The objectives shall be clearly stated to provide a concise, nonquantitative description of the test's purpose and scope.

2.0 ACCEPTANCE CRITERIA. The established criteria which must be met to verify that system performance is acceptable, and may be either quantitative or qualitative.

3.0 REFERENCES. List of documents which support the procedure's objectives and acceptance criteria. References are identified by document title, number, and revision (number and/or date) as appropriate.

4.0 PREREQUISITES. The activities normally required to be completed prior to the start of the tests are stated here.

5.0 INITIAL CONDITIONS. Those conditions which must be established or satisfied prior to testing, are stated including a list of required test equipment, equipment identification and any special equipment configuration.

6.0 PRECAUTIONS AND NOTES. Special precautions and limitations needed for the safety of personnel or equipment, including general notes relating to conduct of the test such as special tagging requirements, use of special lineups, and methods to minimize effects of the test on other systems are listed.

7.0 DETAILED TEST PROCEDURE. This describes the procedure to followed during conduct of the test. Data required by this procedure is recorded in the body of the procedure or on data sheets attached to the procedure.

8.0 SYSTEM RESTORATION. This lists the steps by which the system is returned to a specified or operational status following testing. Examples include the removal and sign off of jumpers, removal of special test instruments and equipment, restoration of instrument settings, etc..

9.0 SUPPORTING MATERIAL. This will include appendices, tables, figures, checkoff lists, lineup lists, data sheets, as necessary.

10.0 ATTACHMENTS. Items generated during test performance, such as recorder tracings, will be identified by test procedure number and step, and attached to the procedure.

14.2.4 Conduct of the Test Program

14.2.4.1 Administrative Controls. Administrative Controls of the HL&P initial test program are contained in the Startup Manual and the appropriate NPOD plant procedures. These instructions and procedures provide detailed guidance to assure that test prerequisites have been met including requirements for inspections, checks, etc. They also require the identification of test personnel completing data sheets, conduct of testing, tagging, etc..

During the transition between preoperational and initial startup testing, continuity is maintained between the Startup Group and the NPOD through the following administrative controls:

1. The NPOD Representative or member of the Joint Test Group provides the interface between NPOD and the Startup Organization. The plant Superintendent is responsible for the coordination of NPOD activities in support of the startup efforts.

2. Administrative control of systems, subsystems, or equipment is transferred between the Startup Group and the NPOD by use of a formal transfer mechanism.

3. Prior to initial fuel loading and the commencement of initial startup testing, a comprehensive review of preoperational tests is conducted to provide assurance that the required plant systems and structures are capable of supporting the initial fuel loading and subsequent startup testing.

4. NPOD administrative and operating procedures for the STP are utilized, as appropriate, by the Startup Organization.

Following completion of the initial startup tests, results are reviewed and evaluated by the Reactor Performance Supervisor and the Technical Support Superintendent. Results are approved by the Plant Manager prior to progressing to the next associated test. Hold points are established in the power ascension program.

14.2.4.2 Maintenance/Modification Procedures. A work request is used to initiate corrective maintenance to systems that have been released to the Startup Organization. The work request form assigns responsibilities for performing the work and identifies retest requirements. Completed work requests are reviewed to ensure retest requirements are addressed. Required procedure changes and resulting retests are reviewed and signed off as specified in the Startup Manual. Design related problems are submitted to the responsible design organization as directed by the Instruction in the Startup Manual.

14.2.4.3 Test Performance. The Startup Manager/Plant Manager assigns a Test Director to direct the tests utilizing approved procedures. A copy of the preoperational or initial startup test procedure is in the test area during the test.

For initial startup tests, each approved test procedure contains the sign-off provisions for the prerequisite and procedural steps as required to control test performance and the sequence of testing. The Test Director and the Shift Supervisor verify that the test prerequisites have been met. The Test Director is responsible for initialing the test procedure to indicate completion of the procedural steps.

If, during the performance of the test, the test cannot be conducted as written, the Test Director obtains an interim revision approval prior to proceeding with that portion of the test. The process of obtaining approval for revisions to preoperational testing procedures is controlled by the Startup Manual.

Temporary changes to initial startup procedures, which clearly do not change the intent of the approved procedures, shall be approved prior to implementation by two members of the plant staff, at least one of whom holds a Senior Reactor Operator's License on the unit affected. Changes to procedures which may involve a change to the intent of the original procedure shall be approved as a revision by the Plant Manager prior to implementation of the change.

14.2.5 Review, Evaluation and Approval of Test Results

14.2.5.1 Prerequisite Test. As prerequisite tests are completed, the test data is reviewed by an Engineer assigned by the Test Group Supervisor and approved by the Startup Manager. Exceptions to completed tests are reviewed prior to the start of Preoperational testing on the associated systems.

14.2.5.2 Preoperational Test. Upon completion of a preoperational test, a Level III Engineer reviews the test results and writes a test report. The test report addresses any deficiencies or exceptions with recommendations for correction, as necessary. The completed preoperational test results, and test report are submitted to the JTG for review and resolution of design problems by the original design organization. Approval is by the Startup Manager.

14.2.5.3 Acceptance Test. Upon completion of an acceptance test, a Level III Engineer reviews the test data and submits it to the Startup Manager for approval. Exceptions to completed tests are reviewed prior to the start of related preoperational testing. Design related problems are submitted to the responsible design organization as directed by the Instructions in the Startup Manual.

14.2.5.4 Initial Startup Test. Completed initial startup test procedures are reviewed by the Reactor Performance Supervisor for conformance with testing requirements and for acceptance of the test results. Following this review, the procedures are submitted to the Technical Support Superintendent for review and evaluation. The Plant Manager approves the escalation of power to the next testing plateau pending satisfactory completion of required testing at the respective power levels.

The initial startup testing phase of the test program is subdivided into the following categories: initial fuel load, precritical testing, initial criticality and low-power physics testing, and power ascension testing. It ends with the plant at 100 percent power. Each subdivision is a prerequisite which must be completed, reviewed, and approved before tests in the next category are started. Power ascension tests are scheduled and conducted at predetermined power levels. The safety of the plant is not totally dependent on the performance of untested systems during the initial startup test program. Insofar as practical, the 25 percent power level will not be exceeded without having tested systems which are relied upon to prevent, to limit, or to mitigate the consequences of postulated accidents; however, testing on some of these systems will not be completed prior to exceeding 25 percent power. The testing plateaus to be used for STP initial startup testing are at 30, 50, 75, 90, and 100 percent of rated power and are accomplished in ascending order of power level.

The plateaus for the power ascension testing are indicated in each test summary. Results from each test conducted at a given plateau are evaluated prior to proceeding to the next level. For those tests which result in a plant transient, for which a realistic plant transient performance analysis has been performed, the test results are compared to the results of the realistic transient analysis rather than the results of the transient analysis based on accident analysis assumptions.

It is intended that the preoperational testing be completed prior to commencing initial fuel loading. Any testing identified which has not been completed is reviewed by the JTG and PORC. Technical justification for not completing any preoperational testing and a schedule, including power level for completion of testing, is provided.

14.2.6 Test Records. Test records are filed and maintained as part of the plant's historical record at the facility in accordance with HL&P's requirements for record retention. The official test copies of the completed test procedure, with the associated data, including data sheets, tables, logs, chart recordings, etc., is included in the file.

14.2.7 Conformance of Initial Test Program with Regulatory Guides. The Regulatory Guides used, as applicable, to develop the initial test program are listed in Chapter 3 Table 3.12-1.

14.2.8 Utilization of Reactor Operating and Testing Experience in Development of the Initial Test Program. HL&P utilizes operating and testing experience from other nuclear plants to develop test procedures and to alert personnel to potential problem areas. This is in accordance with NUREG0737 item I.C.5.

Data is accumulated from NRC and INPO documents. Typically, these documents are:

- Inspection and Enforcement Bulletins
- Inspection and Information Notices
- Vendor Inspection Reports
- Generic Letters
- Significant Event Reports
- Significant Operating Experience Reports
- Operating and Maintenance Reminders

These documents are distributed by Nuclear Licensing to affected organizations. Reviews examine pertinent operating data on similar plants occuring during a period of two years prior to the review. These reviews are to be completed in sufficient time to permit the findings to be incorporated into the initial test program.

Nuclear Licensing is responsible for the initial review and distribution of the documents. The HL&P Startup Manager and Plant Manager ensures that reviews are conducted and the information is utilized in the preparation of the initial test program, as required.

14.2.9 Trial Use of Plant Operating and Emergency Procedures. Plant procedures that are used or referenced during the initial test program include plant operating procedures, maintenance procedures, emergency procedures, chemistry procedures and radiation protection procedures. The schedule for developing these plant procedures is described in Chapter 13.

Adequacy of plant procedures is checked to the maximum extent possible during the initial test program.

14.2.10 Initial Fuel Loading and Initial Criticality. Fuel loading begins when required system tests and operations are satisfactorily completed and the NRC operating license received. Upon completion of fuel loading, the reactor upper internals and pressure vessel head are installed and additional mechanical and electrical tests performed prior to initial criticality. After final precritical tests are completed, initial operation of the reactor begins.

14.2.10.1 Initial Fuel Loading. The overall responsibility and direction of the initial core loading is exercised by the Plant Manager or designee. The process of initial core loading is directed from the operating floor of the containment structure. Procedures for the control of personnel access and the maintenance of containment security are implemented prior to commencing loading operations. The composition, duties and emergency responsibilities of the fuel handling crew are specified.

The Reactor Containment structure is completed and the Containment integrity established prior to commencing loading operations. Radiation monitors, nuclear instrumentation, manually initiated alarms, and other devices to actuate building evacuation alarm and ventilation control are tested and operating.

Fuel-handling tools and equipment are ready and dry runs conducted in their use and operation. Inspection of fuel assemblies, control rods, and burnable poison assemblies is complete.

The status of the reactor vessel and associated components is specified to ensure that they are in a state of readiness to receive fuel. Water level is maintained above the centerline of the nozzles, and reactor coolant recirculation is established to maintain a uniform boron concentration.

The initial core configuration is specified as part of the core design studies. In the event that mechanical damage is sustained during core-loading operations to a fuel assembly of a type for which no spare is available onsite, core-loading operations shall be suspended until an alternate core-loading scheme whose characteristics closely approximating those of the initially prescribed pattern has been determined.

The core is assembled in the reactor vessel; submerged in water containing enough dissolved boric acid to maintain a calculated core effective multiplication factor of $K_{eff} \leq 0.95$. The refueling cavity is dry during initial core loading. Core moderator chemistry conditions are verified by chemical analysis of moderator samples taken at routine intervals.

Core-loading instrumentation consists of two permanently installed source-range channels and two temporary in-core source-range channels. A response check of nuclear instruments to a neutron source is made within eight hours prior to loading (or resumption of loading, if delayed for 8 hours or more). The permanent channels are monitored in the main control room by licensed station operators; the temporary channels are installed in the containment structure and monitored by qualified engineering personnel and licensed station operators. At least one permanent channel is equipped with an audible count-rate indicator. Both permanent channels have the capability of displaying the neutron flux level on a strip chart recorder. The temporary channels indicate on count-rate meters with a minimum of one channel recorded on a strip chart recorder. Minimum count rates of one-half count per second, attributable to core neutrons, are required on at least two of the four available source-range channels at all times following installation of the initial nucleus of eight fuel assemblies.

An initial nucleus of eight fuel assemblies, the first of which contains an activated neutron source, is the minimum source-fuel nucleus that permits subsequent meaningful inverse count-rate monitoring. This initial nucleus is determined, by calculation and previous experience, to be markedly subcritical ($k_{eff} \leq 0.90$) under the required conditions of loading.

At least two artificial neutron sources are introduced into the core at specified points in the core-loading program to ensure a minimum count rate of one-half count per second for adequate monitoring of the core.

Fuel assemblies are placed in the reactor vessel one at a time in accordance with a previously established and approved sequence developed to provide reliable core monitoring. The core-loading procedure documents include detailed tabular check sheets which prescribe and verify the successive movements of each fuel assembly from its initial position in the storage racks to its final position in the core. Multiple checks are made of component serial numbers and types at successive transfer points to guard against possible inadvertent exchanges or substitutions of components. A fuel assembly status board is maintained throughout the core-loading operation in the main control room.

Each subsequent fuel addition is accompanied by detailed neutron count-rate monitoring to determine that the just loaded fuel assembly does not excessively increase the count rate and that the extrapolated inverse count-rate ratio is not decreasing for unexplained reasons. The results of each loading step are evaluated before the next prescribed step is started.

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

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

2. The neutron count rate on any individual source-range channel increases by a factor of five during any single loading step after the initial nucleus of eight fuel assemblies is loaded (excluding anticipated changes due to detector and/or source movements.

3. A decrease in boron concentration greater than 20 ppm is determined from two successive samples of Reactor Coolant System water until the decrease is explained.

An alarm in the containment and main control room is coupled to the source-range channels with a setpoint at five times the current count rate. This alarm automatically alerts the loading operation personnel of high count rate and requires an immediate stop of the loading operations until the situation is evaluated. In the event the alarm is actuated during core loading and after it has been determined that no hazards to personnel exist, preselected personnel are permitted to re-enter the Containment to evaluate the cause and determine future action.

Core-loading procedures specify the condition of fluid systems to prevent inadvertent dilution of the reactor coolant, the movement of fuel to preclude the possibility of mechanical damage, and the conditions under which loading can proceed.

14.2.10.2 Initial Criticality. The approach to initial criticality is conducted according to approved written procedures which specify the plant conditions, safety and precautionary measures, and specific instructions. The procedures also delineate the chains of responsibility and authority in effect during this period of operation.

The systems required for startup or protection of the plant are operable. Alignment of the fluid systems are specified to provide controlled "start" and "stop" as well as adjustments of the rate of approach to criticality.

Inverse count rate monitoring, using data from the normal plant source-range instrumentation, is used as an indication of the proximity and rate of approach to criticality. Inverse count-rate ratio data are plotted as a function of rod bank position during rod motion and as a function of primary water addition during Reactor Coolant System (RCS) boron concentration reduction.

A neutron count rate of at least 1/2 count-per-second will be visible on the startup channels before startup begins, and the signal-to-noise ratio will be known to be greater than two.

Initial criticality is achieved by shutdown and control bank withdrawal and Reactor Coolant System (RCS) boron concentration reduction. Criticality predictions for boron concentration and control rod positions are provided as well as actions to be taken in the event that actual plant conditions deviate from predicted values.

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

The boron concentration in the RCS is then reduced by the addition of primary water. Criticality is expected to be achieved during boron dilution. Rod withdrawal or dilution during approach to criticality is suspended if abnormal tracking of count rates is observed and resumed when effective control can be maintained.

Throughout this period, samples of the primary coolant are obtained and analyzed for boron concentration.

Successive stages of control rod assembly group withdrawal and of boron concentration reduction are monitored by observing changes in neutron count rate, as indicated by the permanent source-range nuclear instrumentation, as functions of group position during rod motion, reactor coolant boron concentration, and primary water addition to the RCS during dilution.

Inverse count-rate ratio monitoring is used as an indication of the proximity and rate of approach to criticality during control rod assembly group withdrawal and during reactor coolant boron dilution. A cautious approach to criticality is conducted to prevent passing through criticality on a period shorter than approximately 30 seconds (less than 1 decade per minute).

14.2.11 Test Program Schedule. The initial test program for STP will be scheduled utilizing a computerized CPM technique. These schedules show certain milestones at which time the tests, or portions of the tests, will be completed, and the overall time frame in which the test will be conducted. Detailed schedules for the test program will be developed on a continuing basis as plant completion progresses.

The startup schedule indicates that preoperational testing will begin approximately 18 months prior to fuel load. The initial startup testing is then scheduled to take place during the 6 months following fuel load. Systems and components which are relied upon to prevent or mitigate consequences of postulated accidents will be tested to the extent practicable prior to fuel load.

The preparation of test procedures is scheduled to support test performance. It is planned to have individual test procedures available in draft form for review by the NRC at least 60 days prior to their scheduled use in the field, and in no case less than 60 days prior to fuel load.

The project schedule indicates that STP Unit 2 fuel load date is approximately 2 years later than fuel load for STP Unit 1. Therefore, there will be no significant division of required personnel to conduct either unit's test program.

14.2.12 Individual Test Descriptions. The initial plant test program is separated into three distinct phases to provide an efficient, comprehensive, and manageable program.

14.2.12.1 Prerequisite Testing. Prerequisite Testing includes requirements for verification and/or completion of various component related testing activities which should normally be completed prior to performing preoperational tests.

The type and extent of prerequisite testing on an individual system, as well as the responsibility for completing such tests, is specified by the Startup Organization. Prerequisite tests are conducted to verify installation, cleanness, integrity, continuity, and operation.

14.2.12.2 Preoperational/Acceptance Testing. Preoperational/Acceptance testing includes the requirements for completion of various testing activities in order to demonstrate the functional and operational capabilities of systems prior to the initial fuel loading.

The following list of safety-related and non safety-related systems will be preoperational/acceptance tested. The test summaries for the safety-related systems provide the general objectives and acceptance criteria for the system test. The specific details, objectives, acceptance criteria and prerequisites are included in the individual test procedure.

The safety-related systems that will be preoperational tested are listed below:

1. Plant Emergency Lighting Preoperational Test Summary

2. Communications System Preoperational Test Summary

3. 125-vdc, IE Battery Systems Preoperational Test Procedure Summary

4. 1E AC Power Distribution System Preoperational Test Summary

5. 1E 120-vac, Systems Preoperational Test Summary

6. Control Room Envelope Heating (HVAC) Preoperational Test Summary

7. Reactor Containment Fan Cooler (RCFC) System Preoperational Test Summary

8. Main Steam Isolation Valve Cubicle HVAC System Preoperational Test Summary

9. Mechanical Auxiliary Building (MAB) HVAC System Preoperational Test Summary

10. Electrical Auxiliary Building (EAB) HVAC System Preoperational Test Summary

11. Diesel-Generator Building (DGB) HVAC System Preoperational Test Summary

12. Fuel-Handling Building (FHB) HVAC System Preoperational Test Summary

13. Essential Cooling Water (ECW) Intake Structure HVAC System Preoperational Test Summary

14. Containment Hydrogen Monitor Preoperational Test Summary

15. Solid-State Protection System (SSPS) Preoperational Test Summary

16. Engineered Safety Features Actuation System Train A, B, and C, Preoperational Test Summary

17. Integrated Safeguards Actuation Preoperational Test Summary

18. Reactor Coolant Pressure Boundary (RCPB) Leakage Detection System Preoperational Test Summary

19. Nuclear Instrumentation System (NIS) Preoperational Test Summary

20. Process and Area Radiation Monitoring System (RMS) Preoperational Test Summary

21. Fire Protection System (Water Subsystem) Preoperational Test Summary

22. Primary Sampling System Preoperational Test Summary

23. Reactor Coolant System Hydrostatic Test Summary

24. Pressurizer Relief Tank Preoperational Test Summary

25. Safety Injection System Preoperational Test Summary

26. Residual Heat Removal (RHR) System Preoperational Test Summary

27. Containment Spray System Preoperational Test Summary

28. Chemical and Volume Control System (CVCS) Preoperational Test Summary

29. Standby Diesel Generator Preoperational Test Summary

30. Boron Recycle System Preoperational Test Summary

31. Main Steam (MS) System Preoperational Test Summary

32. Auxiliary Feed Water (AFW) System Preoperational Test Summary

33. Fuel-Handling Equipment Preoperational Test Summary

34. Spent Fuel Pool Cooling System Preoperational Test Summary

35. Essential Cooling Water System (ECWS) Preoperational Test Summary

36. Component Cooling Water System (CCWS) Preoperational Test Summary

37. Gaseous Radwaste System Preoperational Test Summary

38. Containment Integrated Leak Rate Test and Structural Integrity Test Summary

39. Radioactive Equipment and Floor Drain Sump System Preoperational Test Summary

40. Solid Radioactive Waste Preoperational Test Summary

41. Liquid Radwaste (Recycle Portion) Preoperational Test Summary

42. Liquid Radwaste (Waste Portion) Preoperational Test Summary

43. Reactor Coolant System Hot Functional Preoperational Test Summary

44. Reactor Coolant System Thermal Expansion and Restraint Preoperational Test Summary

45. Power Conversion and ECCS System Thermal Expansion Preoperational Test Summary

46. Operational Vibration Preoperational Test Summary

47. Combustible Gas Control System Preoperational Test Summary

48. Time Response Preoperational Test Summary

49. Reactor Trip Breaker Preoperational Test Summary

50. Reactor Makeup Water System Preoperational Test Summary

The following list of non-safety related systems identified in Reg. Guide 1.68 Appendix A will be Acceptance Tested:

1. Condensate System
2. Feedwater System
3. Condenser Air Removal System
4. Heater Drip system
5. Turbine Vents, Drains and Extraction Steam System
6. Steam Generator Blowdown System
7. Electro-Hydraulic Controls System
8. Circulating Water System
9. Open Loop Auxiliary Cooling System
10. Closed Loop Auxiliary Cooling System
11. Instrument Air System
12. Chilled Water Systems
13. Containment Bldg. Misc. HVAC Systems
14. Auxiliary Bldgs. HVAC Systems
15. Turbine Bldg. HVAC System
16. Miscellaneous Bldgs. HVAC Systems
17. Cranes and Hoists (JZ01 to JZ09)
18. Freeze Protection
19. Refueling Machine
20. Site Radio System, Communications Telephones
21. Seismic Monitoring System
22. Rod Control System
23. Loose Parts Monitoring System
24. Flux Mapping System
25. Incore Thermocouple System

26. Incore Thermocouple - RTD Cross-calibration
27. Rod Position Indication System
28. Main Turbine System
29. BOP Chemical Feed System
30. 13.8 KV Auxiliary Power Buses
31. 4 KV Auxiliary Power Buses
32. 480 V Auxiliary Power Distribution
33. Main, Auxiliary and Standby Transformers

STP FSAR

1. Plant Emergency Lighting Preoperational Test Summary

a. Test Objective

Purpose of the test is to demonstrate the emergency lighting systems respond to a loss of normal lighting as per design.

b. Acceptance Criteria

The emergency lighting system provides adequate illumination for access to safety-related control equipment for the designed duration following a loss of normal lighting.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) De-energize the normal area lighting and verify that the ac and/or dc emergency lighting system responds as per design.

2. Communications System Preoperational Test Summary

a. Test Objective

The test will demonstrate that the Communications System meets requirements for all designed modes of operation.

b. Acceptance Criteria

The Communication System performs as described in applicable design documents.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

Verify both on-site and off-site communication systems function as per design.

3. <u>125VDC 1E Battery Systems Preoperational Test Summary</u>

a. Test Objective

This test will demonstrate that the battery and associated chargers meet the design intent.

b. Acceptance Criteria

1) The battery will maintain the terminal voltage equal to or greater than the design minimum during the calculated service profile load cycle.

2) The battery chargers provide the designed battery recharge and steady-state load response.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) Apply test load equivalent to calculated service profile values and verify the battery terminal voltage meets the design requirement.

2) Recharge battery from designed minimum value and verify battery chargers provide the required response.

4. <u>1E AC Power Distribution Preoperational Test Summary</u>

a. Test Objective

The purpose of this test is to demonstrate that the 1E AC power systems satisfy the distribution design requirements.

b. Acceptance Criteria

Interlocks, controls, and power distribution from required off site sources perform as described in applicable design documents.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required supports systems are available.

d. Test Method

1) Verify the source and feeder breakers meet the power distribution design intent by functional operation.

5. <u>1E 120VAC Systems Preoperational Test Summary</u>

a. Test Objective

The purpose of the test is to demonstrate the ability of the 1E 120VAC systems to meet the design intent.

b. Acceptance Criteria

Both the preferred (INVERTER) and alternate (REGULATING TRANSFORMER) sources perform as per design in supplying nominal 120 VAC to the 1E Vital Instrument Distribution Centers.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) Verify the preferred and alternate sources meet the design requirements for voltage, regulation and switching capability.

6. Control Room Envelope HVAC System Preoperational Test Summary

a. Test Objectives

This test will demonstrate that the Control Room HVAC System provides adequate cooling to the Control Room and it's areas and the Control Room environment is maintained as designed.

b. Acceptance Criteria

1) The Control Room HVAC System operates at design pressure and in accordance with design requirements.

2) Automatic controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

4) System air balancing has been completed.

d. Test Method

1) The Control Room HVAC System will be operated in its design modes of operation to verify controls and interlocks and to determine system operating characteristics.

2) The Air Filtration Units operate in accordance with design requirements.

7. Reactor Containment Fan Cooling (RCFC) System Preoperational Test Summary

a. Test Objectives

This test will demonstrate that the Reactor Containment Fan Cooling System provides adequate cooling to the reactor containment areas and operates per design.

b. Acceptance Criteria

1) The Reactor Containment Fan Cooling System operates in accordance with design requirements.

2) Automatic controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

4) System air balancing has been completed.

d. Test Method

The Reactor Containment Fan Cooling System will be operated in its design modes of operation to verify controls and interlocks and to determine system operating characteristics.

8. Main Steam Isolation Valve (MSIV) HVAC System Preoperational Test Summary

a. Test Objectives

This test will demonstrate that the Main Stream Isolation Valve HVAC System provides adequate cooling to the Isolation Valve and Aux. Feedwater Pump areas and operates per design.

b. Acceptance Criteria

1) Main Steam Isolation Valve HVAC System operates in accordance with design requirements.

2) Automatic controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

4) System air balancing has been completed.

d. Test Method

The Main Steam Isolation Valve Cooling system will be operated in its design modes of operation to verify controls and interlocks and to determine system operating characteristics.

9. Mechanical Aux. Building (MAB) HVAC System Preoperational Test Summary

a. Test Objectives

This test will demonstrate that the Mechanical Aux. Building HVAC System provides adequate cooling to the Mechanical Aux. Building areas and operates per design.

b. Acceptance Criteria

1) Mechanical Aux. Building HVAC system operates in accordance with design requirements.

2) Automatic controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

4) System air balancing has been completed.

d. Test Method

1) The Mechanical Aux. Building Cooling system will be operated in its design modes of operation to verify controls and interlocks and to determine system operating characteristics.

2) Th Air Filtration unis operate in accordance with design requirements.

10. Electrical Aux. Building (EAB) HVAC System Preoperational Test Summary

a. Test Objectives

This test will demonstrate that the Electrical Aux. Building HVAC System provides adequate cooling to the Electrical Aux. Building areas and operates per design.

b. Acceptance Criteria

1) Electrical Aux. Building Cooling System operates in accordance with design requirements.

2) Automatic controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

4) System air balancing has been completed.

d. Test Method

1) The Electrical Aux. Building HVAC System will be operated in its design modes of operation to verify controls and interlocks and to determine system operating characteristics.

2) The Air Filtration Units operate in accordance with design requirements.

11. Diesel Generator Building (DGB) HVAC System Preoperational Test Summary

a. Test Objectives

This test will demonstrate that the Diesel Generator Building HVAC System provides adequate cooling and combustion air to the respective Diesel Generator areas and operates per design.

b. Acceptance Criteria

1) Diesel Generator Building HVAC operates in accordance with design requirements.

2) Automatic controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

4) System air balancing has been completed.

d. Test Method

The Diesel Generator Building HVAC system will be operated in its design modes of operation to verify controls and interlocks and to determine system operating characteristics.

12. Fuel Handling Building (FHB) HVAC System Preoperational Test Summary

a. Test Objectives

This test will demonstrate that the Fuel Handling Building HVAC System provides adequate cooling to the Fuel Handling Building areas and operates per design.

b. Acceptance Criteria

1) Fuel Handling Building HVAC system operates at design pressure and in accordance with design requirements.

2) Automatic controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

4) System air balancing has been completed.

d. Test Method

1) The Fuel Handling Building HVAC system will be operated in its design modes of operation to verify controls and interlocks and to determine system operating characteristics.

2) The Air Filtration Units operate in accordance with design requirements.

13. Essential Cooling Water (ECW) Intake Structure HVAC Preoperational Test Summary

a. Test Objectives

This test will demonstrate that the Essential Cooling Water Intake Structure HVAC System provides adequate cooling to the Essential Cooling Water Pump Areas and operates per design.

b. Acceptance Criteria

1) Essential Cooling Water Intake Structure HVAC System Operates in accordance with design requirements.

2) Automatic controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

4) System air balancing has been completed.

d. Test Method

1) The Essential Cooling Water Intake Structure system will be operated in its design modes of operation to verify controls and interlocks and to determine system operating characteristics.

14. Containment Hydrogen Monitor Preoperational Test Summary

a. Test Objective

The purpose of this is to demonstrate that the Containment Hydrogen Monitor System functions as designed.

b. Acceptance Criteria

1) The Containment Hydrogen Monitor System provides the designed indication, and interlock functions.

2) The design flow rate through the associated monitor can be achieved.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) Verify by calibration that the gas sample flow rates and indication meets design.

2) Verify by simulation that the interlock function meets the design.

15. Solid-State Protection System (SSPS) Preoperational Test Summary

a. Test Objective

The purpose of the test is to verify the logic and time response of the reactor protection system.

b. Acceptance Criteria

1) The SSPS logic circuits operate as per design requirements.

2) The response time of the trip circuit logic combinations meet the design requirements.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisites test have been completed.

3) Required support systems are available.

d. Test Method

1) Verify the trip logic combinations, redundancy, fail safe (loss-of-power) mode and response times agree with the applicable design documents.

NOTE: Reactor trip time shall be the time interval from when the monitored parameter exceeds the designed trip value at the sensor until loss of stationary gripper coil voltage.

16. Engineered Safety Features Actuation System Train A, B, and C Preoperational Test Summary.

a) Test Objectives

The purpose of this test is to demonstrate that the Safeguards Actuation System performs as designed.

b) Acceptance Criteria

The response of the Safeguard Actuation System meets the functional and time response design requirements.

c) Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d) Test Method

1) Verify by functional test that the Safeguard Actuation System actuates the Safeguard components as described in appropriate design documents.

17. Integrated Safeguards Actuation Preoperational Test Summary

a. Test Objective

The purpose of this test is to demonstrate that the Safeguard Systems respond as designed with and without off-site power availability.

b. Acceptance Criteria

The Safeguards Systems components respond as designed to the following:

1) Simulated Safety Injection with off-site power sources available.

2) Loss of off-site power to the plant with and without safety injection signal.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Methods

1) Verify the Safeguards Systems respond as designed to a loss of off-site power only.

2) Verify that with or without off-site power, the Safeguards Systems respond as required to a safety injection signal.

18. Reactor Coolant Pressure Boundary (RCPB) Leakage Detection System Preoperational Test Summary.

a. Test Objective

This test will demonstrate the system capability to detect the presence of significant leakage from the reactor coolant loops to the containment atmosphere during normal operations.

b. Acceptance Criteria

The subsystems which comprise the RCPB leak detection system provide for monitoring and indication of RCPB leakage in accordance with design requirements.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

Verify proper functioning of containment air particulate monitor, radioactive gas monitor detectors, condensate collection monitor, sump level monitors, humidity monitoring and containment wide range pressure instrumentation indications and interlocks.

19. Nuclear Instrumentation System (NIS) Preoperational Test Summary.

a. Test Objective

The purpose of this test is to verify the interlock and indication functions of the Nuclear Instrumentation System meet the design requirements.

b. Acceptance Criteria

1) The interlocks and indication meet the applicable design document requirements.

2) The reactor trip signals derived from this system meet the design requirements.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) Verify by simulated inputs that the particular interlocks and indication provided by each channel meet the design requirements.

2) Verify the source range plateau with a neutron source.

20. Process and Area Monitoring System (RMS) Preoperational Test Summary

a. Test Objective

The purpose of this test is to demonstrate that the control and interlocks provided by the RMS meet the design requirements.

b. Acceptance Criteria

1) The RMS provides the designed interlock and indication.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) Verify by simulation that functional performance meets the design requirement.

21. Fire Protection System (water subsystem) Preoperational Test Summary.

a. Test Objectives

This test will demonstrate that the fire protection system is capable of providing water for fire fighting.

b. Acceptance Criteria

1) Fire pumps meet design point pressure and flow in accordance with the design requirements.

2) Automatic controls and interlocks function in accordance with design.

(Note the testing and certification of the foam, foam water sprinkler, fixed water spray deluge and Halon systems will be performed by the systems subcontractor and accepted by the field contracts manager).

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

Simulate necessary signals to operate the fire water protection system to verify controls, interlocks and pump characteristics meet design requirements.

22. Primary Sampling System Preoperational Test Summary

a. Test Objectives

This test will demonstrate that the primary sampling system is capable of transporting process samples.

b. Acceptance Criteria

The primary sample system, system coolers, pressure regulating devices, sample analyzers and sample selection valves function in accordance with the design requirements.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) Demonstrate that liquid and gas samples can be obtained from sample points and that samples obtained are within prescribed tolerance when compared with laboratory analyzed samples.

2) Establish purge times, measure inlet and outlet temperatures and pressures of sample cooler to verify proper operation.

23. Reactor Coolant System (RCS) Hydrostatic Test Summary

a. Test Objective

This test will demonstrate the integrity and leak tightness of the RCS by performing a hydrostatic test of the system in accordance with Section III of the ASME Boiler and Pressure Vessel Code.

b. Acceptance Criteria

The cold hydrostatic test satisfactorily verifies the integrity and leak tightness of the RCS Welds.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) With RCS aligned, filled, vented and temperature above the test nil-ductility temperature requirement, pressurize the RCS within the maximum allowable rate in the prescribed increments until desired test pressure is obtained and stabilized at the test pressure for the required time.

2) Reduce test pressure to the design pressure and perform RCS inspections.

3) Reduce system pressure to below the test pressure value.

24. Pressurizer Relief Tank (RPT) Preoperational Test Summary

a. Test Objective

This test will verify that the pressurizer relief tank provides for adequate control of the discharge from the primary power relief and safety valves.

b. Acceptance Criteria

PRT provides for control and disposal of primary plant coolant discharge from power relief and safety valves in accordance with design requirements.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) Verify interlock operations, spray flow within specified internal tank pressures and transfer flow path from PRT.

2) Verify the flow through the reactor coolant drain tank heat exchanger for cooling of the PRT contents meets design requirements.

3) Verify ability to maintain nitrogen blanket in the PRT.

25. Safety Injection System Train A, B, and C Preoperational Test Summary

a. Test Objective

This test will demonstrate that the SIS provides emergency core cooling following a loss of coolant accident.

b. Acceptance Criteria (Cold)

1) Safety injection pumps meet design point pressure and flow in accordance with design requirements.

2) Automatic controls and interlocks function in accordance with design requirements.

3) Accumulator performance is in accordance with design requirements.

Acceptance Criteria (Hot)

Accumulator discharge check and isolation valves function according to design requirements.

c. Prerequisites (Cold)

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisites test have been completed.

3) Required support systems are available.

4) Reactor vessel is open to the refueling cavity and the refueling pool is available to receive water.

Prerequisites (Hot)

1) Cold prerequisites 1, 2, and 3.

2) Reactor coolant system is closed, hot and pressurized.

d. Test Method (Cold)

The SIS will be operated in its design modes of operation to verify controls and interlocks and to determine system operation characteristics.

Test Method (Hot)

The SIS will be operated in its design modes of operation to verify controls and interlocks and to determine system operation characteristics.

26. Residual Heat Removal (RHR) System Preoperational Test Summary

a. Test Objective

This test will demonstrate the RHR system is capable of providing the required flow to the RCS for plant cooldown.

b. Acceptance Criteria

1) RHR pump meet design point pressure and flow in accordance with the design requirements.

2) Automatic controls and interlocks function in accordance with the design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

The RHR System will be operated in its design modes of operation to verify controls and interlocks and to determine system operating characteristics. NOTE: RCS cooldown capabilities will be verified during hot functional.

27. Containment Spray System Preoperational Test Summary

a. Test Objective

This test will demonstrate that the Containment Spray System provides adequate water with additives at the required pressure for containment spray and to verify that the spray header and nozzles are unobstructed.

b. Acceptance Criteria

1) Containment spray pumps design point pressure and flow are in accordance design requirement.

2) Spray header and nozzles are unobstructed.

3) Automatic controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

4) Temporary piping is installed from the spray header test connection to drain.

d. Test Method

1) The Containment Spray System will be operated in its design modes of operation to verify controls and interlocks and to determine system operation characteristics.

2) Force air through the containment spray ring headers and verify spray nozzles are open.

28. Chemical and Volume Control System (CVCS) Preoperational Test Summary

a. Test Objective

This test will demonstrate that the CVCS System functions according to design.

b. Acceptance Criteria

1) The charging pumps meet design point pressure and flow in accordance with design requirements.

2) The charging and letdown, volume control, chemical control, purification, boric acid and makeup and boron thermal regeneration subsystems function in accordance with design requirements.

3) Automatic controls and interlocks function in accordance with design requirements.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

The CVCS System will be operated in its design modes of operation to verify controls and interlocks and to determine system operation characteristics.

29. Standby Diesel Generators Preoperational Test Summary

a. Test Objective

The purpose of this test is to demonstrate that the Standby Diesel Generators and support systems meet the design requirements.

b. Acceptance Criteria

The controls, interlocks and capabilities of the Standby Diesel Generators meet the design requirements.

c. Prerequisites:

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) Verify controls, interlocks and support systems respond per design requirements.

2) Verify the multi-start and static load capability of each Standby Diesel Generator meet the design requirements.

30. Boron Recycle System Preoperational Test Summary

a. Test Objective

The test will demonstrate that the Boron Recycle System is capable of recovering boron from reactor coolant transferred to this system.

b. Acceptance Criteria

1) System pumps meet design point pressure and flow in accordance with the design requirements.

2) The recycle evaporator, demineralizers and filters operate within design limits.

3) Automatic controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

The Boron Recycle System will be operated in its design modes of operation to verify controls and interlocks and to determine system operation characteristics.

31. <u>Main Steam (MS) System Preoperational Test Summary</u>

a. Test Objective

This test will demonstrate the capability of MS system components to operate in accordance with design.

b. Acceptance Criteria

1) MS isolation valves, dump valves and power relief valves operate in accordance with design requirements.

2) Automatic controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

Simulate the necessary signals and operate the MS system in its design modes of operation to verify controls and interlocks and to determine system operation characteristics.

32. Auxiliary Feedwater (AFW) System Preoperational Test Summary

a. Test Objective

This test will demonstrate that the AFW system provides adequate feedwater to the steam generators when the Main Feedwater System is not in service.

b. Acceptance Criteria

1) AFW pumps meet design point pressure and flow in accordance with the design requirements.

2) Automatic controls and interlocks function in accordance with design. (NOTE: Turbine-driven auxiliary feed pump will be tested during hot functional testing).

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

The AFW System will be operated in its design modes of operation to verify controls and interlocks and to determine system operation characteristics.

33. Fuel Handling Equipment Preoperational Test Summary

a. Test Objective

This test will demonstrate that the fuel handling equipment is capable of loading/unloading fuel into/from the reactor vessel in accordance with system design.

b. Acceptance Criteria

1) Fuel Handling System (FHS) is capable of picking up, transferring and loading fuel assemblies from the new fuel storage area into the reactor vessel and from the reactor vessel to the spent fuel pool.

2) FHS controls, interlocks and fuel handling tools function as designed.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) Load test cranes and hoists both static and dynamic.

2) Operate the system to successfully transfer a dummy fuel assembly from the new fuel storage area to the reactor vessel and to the spent fuel pool.

3) By operation or stimulated operation of the system, verify that controls and interlocks function.

34. Spent Fuel Pool Cooling System Preoperational Test Summary

a. Test Objective

This test will demonstrate that the Spent Fuel Pool Cooling and Purification System functions as designed.

b. Acceptance Criteria

1) Spent fuel pool cooling pumps meet design point pressure and flow in accordance with the design requirements.

2) Filters and demineralizers maintain the water within the prescribed limits.

3) Automatic controls and interlocks function in accordance with design requirements.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

The Spent Fuel Pool Cooling System will be operated in its design modes of operation to verify controls and interlocks and to determine system operation characteristics.

35. Essential Cooling Water System (ECW) Preoperational Test Summary

a. Test Objective

This test will demonstrate that each loop of the ECW System is capable of providing adequate cooling water flow to the connected heat exchangers.

b. Acceptance Criteria

1) ECW pumps meet design point pressure and flow in accordance with design requirements.

2) Automatic controls and interlocks function in accordance with design requirements.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisites tests have been completed.

3) Required support systems are available.

d. Test Method

The ECW System will be operated in its design modes of operation to verify controls and interlocks and to determine system operation characteristics.

36. Component Cooling Water System (CCW) Preoperational Test Summary

a. Test Objective

This test will demonstrate that each train of the CCW System is capable of providing adequate cooling water flow to the connected heat exchangers.

b. Acceptance Criteria

1) CCW pumps meet design point pressure and flow in accordance with design requirements.

2) Automatic controls and interlocks function in accordance with design requirements.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

The CCW System will be operated in its design modes of operation to verify controls and interlocks and to determine system operation characteristics.

37. Gaseous Radwaste System Preoperational Test Summary

a. Test Objective

This test will demonstrate that the Gaseous Radwaste System is capable of transporting and processing radioactive gases.

b. Acceptance Criteria

1) System flows, pressures and temperatures are in accordance with the system design.

2) Automatic controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

The Gasecus Radwaste System will be operated in its design modes of operation to verify controls and interlocks and to determine system operation characteristics.

38. Containment Integrated Leak Rate Test and Structural Integrity Test Summary

a. Test Objective

This test will verify that the structural integrity of the Containment is adequate to withstand postulated pressure loads and that the integrated leakage rate will not exceed the Containment Design Basis Accident leakage rate of 0.3 percent of the Containment volume in 24 hours at the maximum calculated pressure.

b. Acceptance Criteria

1) The containment structure meets structural integrity requirements as required by applicable regulatory guides and the approved test procedure.

2) The integrated leak rate is verified to be within allowable limits as set forth in FSAR Section 6.2.6.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) The test method for the structural integrity test of the Containment is described in FSAR section 3.8.1.7.

2) The test method for the integrated leak rate test is described in FSAR Section 6.2.6.

39. Radioactive Equipment and Floor Drain Sump System Preoperational Test Summary

a. Test Objective

This test will demonstrate the capability of the radioactive equipment and floor drains sump system to collect and pump water to the Liquid Radwaste System.

b. Acceptance Criteria

1) Sump pumps meet design point pressure and flow in accordance with the design requirements.

2) Controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

The radioactive equipment and floor drain sump system will be operated in its design modes of operation to verify controls and interlocks and to determine system operation characteristics.

4C. Solid Radioactive Waste Preoperational Test Summary

a. Test Objective

This test will demonstrate the capability of the Solid Radwaste System to collect and transport the concentrated liquid and spent resins to the portable solidification mobile location.

b. Acceptance Criteria

1) Installed Radwaste System components function in accordance with design requirements.

2) Automatic/remote controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) Operate or simulate operation of the system to verify that controls, and interlocks function as designed.

2) Perform resin sluicing from the most remote demineralizer to the spent resign storage tank and verify the spent resin can be transferred to the portable solidification system mobile location.

41. Liquid Radwaste (Recycle Portion) Preoperational Test Summary

a. Test Objective

This test will demonstrate that the Liquid Radwaste System (recycle portion) collects and processes water from system drains, equipment drains, valve leakoffs, pump seal leakoffs and tank overflows.

b. Acceptance Criteria

1) The pumps meet design point pressure and flow in accordance with system design.

2) Waste evaporator performance is in accordance with design specifications.

3) The differential pressure across demineralizers and filters at rated flow are in accordance with system design.

4) Controls and interlocks function in accordance with system design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

The Liquid Radwaste System (recycle portion) will be operated/simulated in its design modes of operation to verify controls and interlocks and determine system operation characteristics.

42. Liquid Radwaste (Waste Portion) Preoperational Test

a. Test Objective

This test will demonstrate that the Liquid Radwaste System (waste portion) collects, processes and discharges water from nonradioactive equipment drains, floor drains and laundry and hot show facilities.

b. Acceptance Criteria

1) The pumps meet design point pressure and flow in accordance with the design requirement.

2) Waste filters pass design rated flow, and filter differentials are in accordance with system design.

3) Automatic controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

The Liquid Radwaste System will be operated or simulated in its design modes of operation to verify controls and interlocks and to determine system operation characteristics.

43. <u>Reactor Coolant System Hot Functional Preoperational Test Summary</u>

a. Test Objective

This test will demonstrate the performance of components and instrumentation required during normal heatup, hot shutdown and cooldown operations of the RCS. Also, the test will provide proper operating temperatures and pressures for performing or completing the component and preoperational tests dependent on these conditions as follows:

1) Reactor coolant pump operation
2) Pressurizer heaters, relief valves, instrumentation and preliminary spray operation
3) Thermal Expansion
4) Steam generator level instrumentation
5) Main steam system, steam bypass and relief valves and safety valve setpoint verification.
6) CVCS - Charging system, normal and excess letdown systems, purification system, seal injection, makeup control and boron thermal regeneration system.
7) Reactor internal vibration exposure
8) RCS and BOP piping vibration measurements
9) Containment HVAC and subsystems
10) Mechanical auxiliary building HVAC
11) Electrical auxiliary building HVAC
12) Component cooling water
13) Turbine driven auxiliary feedwater pump
14) Motor driven auxiliary feedwater pumps
15) Primary sampling system
16) Primary chemistry control
17) SIS accumulator system
18) RHR system operation
19) Demonstrate the ability to perform a cold shutdown from outside the control room
20) Provide a temperature correlation for verifying the bench test setpoints for pressurizer safety valves.

b. Acceptance Criteria

1) Satisfactory performance of components and systems that are exposed to RCS temperatures and pressures is demonstrated.

2) Preoperational tests dependent upon RCS temperatures and pressures meet the requirements of the approved test procedures and design requirements.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) General guidelines for the conduct of the hot functional test program will be provided.

2) Using the reactor coolant pumps as a heat source, perform a heatup, steady state operation and cooldown of the RCS utilizing approved operating procedures to the extent practical. Perform the prescribed preoperational testing at the designated conditions.

44. Reactor Coolant System Thermal Expansion and Restraint Preoperational Test Summary

a. Test Objective

This test will determine the movement of the RCS and demonstrates that the thermal expansion confirms predicted anaytical design movements and thermal stresses within the system. It will assure that the RCS can expand without obstruction during the initial system heatup from the cold condition to operation conditions and confirm the design travel, operability and acceptability of system supports and restraints. It will also demonstrate the RCS piping components return to their baseline cold position after the initial cooldown to ambient conditions.

b. Acceptance Criteria

1) Unrestricted expansion and acceptable predicted movements are verified for selected points on components and piping of RCS in accordance with approved procedures.

2) The components and piping are verified to return to their baseline cold positon within specified tolerances.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

Prior to, during and following the RCS hot functional test, position measurement data are recorded and evaluated at intervals specified in the detailed test procedure.

45. Power Conversion and ECCS System Thermal Expansion Preoperational Test Summary

a. Test Objective

This test will demonstrate that during heatups and cooldowns ASME class 1,2, 3 and selected high/moderate energy piping, hanger and snubber deflections are within acceptable limits.

b. Acceptance Criteria

1) Specified hangers and snubbers remain within cold and hot allowable movement tolerances.

2) Piping movements do not cause undue stresses or misalignments on associated components and return to within 25% of baseline position on cooldown.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

Prior to, during and following the hot functional test, position measurements data are recorded and evaluated at intervals specified in the detailed test procedure.

46. Operational Vibration Preoperational Test Summary

a. Test Objective

This test will verify that the ASME class 1, 2, 3. and selected high/moderate energy system piping and supports have been adequately designed to withstand dynamic effects and that transient and steady state vibrations (as applicable) are within acceptable limits.

b. Acceptance Criteria

The vibrational deflection measurements for piping and components are within acceptable limits as outlined in Section III of the ASME code.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

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

47. <u>Combustible Gas Control System Preoperational Test Summary</u>

a. Test Objective

The purpose of the test will be verify the operation of the electric hydrogen recombiners.

b. Acceptance Criteria

Controls, interlocks and system operation meet the design intent.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) Verify controls, interlocks and system operation are in accordance with applicable design documents.

48. Time Response Preoperational Test Summary

a. Test Objective

The purpose of this test is to document that the response time of Safeguards and Reactor trip systems meet the design requirement.

b. Acceptance Criteria

The response times for Safeguards and Reactor trip systems are within the values specified in applicable design documents.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) Verify that the time response data accumulated during prerequisite and/or system tests meet the design requirements.

49. Reactor Trip Breakers Preoperational Test Summary

a. Test Objective

The purpose of the test is to verify the operation of the Reactor Trip Breaker control circuitry in all modes of operation.

b. Acceptance Criteria

The Reactor Trip and Bypass Breaker control circuitry meet the design requirements.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

1) Verify the controls, interlocks and Reactor Trip and Bypass Breakers function per applicable design documents.

50. <u>Reactor Makeup Water System Preoperational Test Summary</u>

a. Test Objective

The test will demonstrate the capability of the reactor Makeup Water system to supply adequate water to user system.

b. Acceptance Criteria

1) Reactor makeup water pumps meet design point pressure and flow in accordance with the design requirements.

2) Automatic controls and interlocks function in accordance with design.

c. Prerequisites

1) Construction has released the system for test in accordance with the Startup Manual.

2) Required prerequisite tests have been completed.

3) Required support systems are available.

d. Test Method

The Reactor Makeup Water System will be operated in its design modes of operation to verify controls and interlocks and to determine system operation characteristics.

14.2.12.3 Initial Startup Testing. Initial Startup testing includes requirements for completion of various initial startup test procedures to initially fuel the reactor, take the reactor critical for the first time, verify the nuclear characteristics for the reactor, check the functional and operational capabilities of the systems at power, and verify acceptance of the plant through integrated operation. The test procedures expected to be performed and their general objectives and acceptance criteria are listed below. Specific, detailed objectives, acceptance criteria, and prerequisites are included in each respective startup test procedure.

The startup tests summarized in the remainder of this section is listed as follows:

1. Moveable Incore Detector Test
2. Rod Position Indication Test
3. Rod Control System Alignment Test
4. Rod Drive Mechanism Timing Test
5. Rod Drop Time Measurement
6. Reactor Coolant System Flow Test
7. Reactor Coolant System Flow Costdown Test
8. Resistance Temperature Detector (RTD) Bypass Flow Verification Test
9. Reactor Protection System Trip Circuits Test
10. Pressurizer Effectiveness Test
11. Water Quality Test
12. Zero-Power Physics Tests
13. Natural Circulation Verification
14. Radiation Survey Test
15. Nuclear Instrumentation Calibration Test
16. Effluent Radiation Monitor Test
17. Flux Distribution Measurements with Normal Rod Pattern Test
18. Axial Xenon Oscillation Test
19. Power Coefficient and Power Defect Measurement Test
20. Plant Response to Load Changes Test

14.2.12.3 (con't)

21. Rod Control System At-Power Test

22. Evaluations of Core Performance Test

23. Full Load Rejection Test

24. Loss of Offsite Power Test

25. Shutdown from Outside the Control Room Test

26. Dynamic Rod Drop Test

27. Static RCCA Drip and RCCA Below-Bank Position Measurements Test

28. Pseudo Rod Ejection Test

29. Chemistry and Radiochemistry Test

30. RCS Loose Parts Monitoring Test

31. Steam Line Isolation Valve Closure Test

32. Feedwater Temperature Reduction Test

33. Automatic Steam Generator Level Control Test

34. Control of Margin to Saturation Test

1. <u>Moveable Incore Detector Test</u>

   a. Test Objective - This test will demonstrate proper alignment response and operation of the moveable incore detectors. A test at low power will be performed to verify detector response to actual flux.

   b. Acceptance Criteria - A minimum number of detectors and thimbles, as required by the Plant Technical specifications, are operable.

   c. Prerequisites

      1) Moveable micro detector thimbles are inserted into the core.

      2) Upper internals are installed in the reactor vessel.

      3) The reactor vessel head is installed with studs tensioned.

      4) The RCS is in the cold shutdown condition or at a power level of 5 percent or less as dictated by the test requirement.

   d. Method

      1) With the reactor in the cold shutdown condition, the system is operated manually and automatically in all modes after setting the indexing and limit switches.

2) With the reactor in the hot standby condition, the response of each channel to simulated detector outputs is verified.

3) With the reactor at approximately 5 percent power, the response of each channel to actual flux is verified.

2. Rod Position Indication Test

a. Test Objective - This test will verify that the Digital Rod Position Indication System satisfactorily performs the required indication and alarm functions for each individual control rod under hot standby conditions.

b. Acceptance criteria - Performance of the Rod Position Indication System for each rod cluster control assembly (RCCA) over its entire length of travel has been verified in accordance with the vendor technical manual.

c. Prerequisites

1) The reactor is at hot standby, no-load operating temperature and pressure with at least one reactor coolant pump running.

2) All Rod Control System equipment has been installed, and all preliminary testing and calibrations have been completed, including testing to demonstrate the operability of inhibit and block functions.

3) Preliminary tests on the Digital Rod Position Indication System have been completed, including the testing to demonstrate the operability of the Rod Insertion Limit Monitor.

4) Pulse-to-analog converters have been aligned.

5) Plant source-range channels shall be in operation and monitored at all times when rods are being moved.

d. Method

1) Verify with all rods fully inserted that rod bottom indication and alarm exists.

2) Verify that the rod bottom indication clears for each rod as it is withdrawn.

3) Verify the rod bottom indication setpoint for each rod as it nears the full-inserted position.

4) With one rod of a bank electrically disconnected, verify that a rod deviation alarm occurs as the other rods in that bank are positioned the required distance.

3. Rod Control System Alignment Test

a. Test Objective - This test will adjust Rod Control System bank sequencing overlap setpoints and demonstrate proper system control and indication.

b. Acceptance Criteria

1) Bank sequencing and overlap setpoints are in accordance with the STP Setpoints document, and step counters perform properly.

2) The Rod Control system performs in accordance with the requirements of the vendor technical manual.

c. Prerequisites

1) Proper identification, connection, and continuity of Rod Control System power and control cabling have been completed.

2) The reactor is in the hot standby condition with control rods latched.

3) Containment integrity is established in accordance with applicable technical specifications.

d. Method

1) The Rod Control System is operated in manual and automatic modes, and indications and alarms are observed.

2) Bank start and stop positions during insertion, withdrawal, and overlap operations are recorded.

3) Setpoint adjustments are made as required.

4. Rod Drive Mechanism Timing Test

a. Test Objective - This test will verify proper timing of each Rod Control System slave cycler and will conduct an operational check of each control rod drive mechanic.

b. Acceptance Criteria - Mechanism timing and operational checks are in accordance with the rod drive mechanism technical manual requirements.

c. Prerequisites

1) All control rod drive mechanism equipment is installed with the RCCAs attached.

2) The RCS is filled and vented.

3) Baseline count rates are established for each source-range channel.

4) The reactor is in the cold shutdown or hot standby condition as dictated by the test requirements.

d. Method

1) With the reactor in the cold shutdown condition, the timing for each slave cycler is set, measured, and reset as necessary.

d. Methods (con't)

2) Each rod drive mechanism is manually operated, checking the latching and releasing features of each in both hot and cold conditions.

5. Rod Drop Time Measurement

a. Test Objective - This test will determine the drop time for each control rod at both full-flow and no-flow conditions with the reactor in the cold shutdown condition and at no-load operating temperature and pressure.

b. Acceptance Criteria - Drop time for each rod, measured in hot-full flow conditions, is less than or equal to the maximum value specified in the Technical Specifications.

c. Prerequisites

1) Initial fuel loading has been completed, and the unit is in the cold or hot standby condition with full-flow or no-flow as required for the particular phase of the test to be performed.

2) Containment integrity has been established in accordance with applicable technical specifications.

3) The Rod Position system is operable.

4) All rod cluster control drive mechanisms have had the preliminary checkout completed.

d. Method

1) Withdraw selected bank to the fully withdrawn position.

2) Conduct individual rod drop tests, recording rod drop initiation, time to dashpot, and total rod drop time.

3) Repeat for all control rods in required conditions of flow and temperature.

4) For each test condition, those control rods whose scram times exceed the two-sigma limit of the scram time data for all control rods, will be retested a minimum of three times.

6. Reactor Coolant System Flow Test

a. Test Objective

1) To measure the RCS flow rate prior to critically using data obtained from installed elbow tap differential (d/p) instrumentation.

2) To verify design RCS flow rate using plant calorimetric data prior to escalating above 50% power.

b. Acceptance Criteria

1) Prior to exceeding 75% power, the total RCS flow rate determined from calorimetric data must be equal to or greater than the thermal design value specified in the FSAR.

c. Prerequisite

1) All four Reactor Coolant Pumps (RCP's) are operating.

2) For the pre-critical measurement, the reactor is in the hot standby condition with all RCCA's at their fully inserted position.

3) For the at-power measurement, reactor power is at the 50% power plateau or greater.

d. Method

1) For the pre-critical measurement, RCS cold leg RTD output voltages and loop elbow tap differential pressure (d/p) signals are used to determine RCS flow rate.

2) For the at-power measurement, plant calorimetric data and hot and cold leg temperatures are used to determine RCS loop flow rates.

7. <u>Reactor Coolant System Flow Castdown Test</u>

a. Test Objective - This test will determine various delay times associated with assumptions made in the analysis of the loss-of-flow accident by measuring the rate at which reactor coolant flowrate decreases, subsequent to reactor coolant pump trips from various flow configurations.

b. Acceptance Criteria

1) The core flow decrease for the first 10 seconds of the transient is, in each case, slower than that assumed in the FSAR.

2) Time delays from actuation to low-flow trip, undervoltage trip, and underfrequency trip actuation are less than or equal to those assumed in the Safety Analysis section of the FSAR.

c. Prerequisites

1) The reactor is in the hot standby condition with all RCCA's at their fully inserted position.

2) All four reactor coolant pumps (RCP's) are operating.

3) The RCS flow test has been completed with flow instrumentation calibrated.

4) Pressure-damping devices installed for the flow test have been removed.

d. Method

1) One shutdown bank of control rods is withdrawn while maintaining the hot shutdown condition.

2) For each of the events listed below, data are recorded:

a) One RCP is tripped, measuring and recording the time from breaker opening to first rod motion.

b) A second reactor coolant pump is tripped, and the first reactor coolant pump is restarted.

c) The three running reactor coolant pumps are then tripped simultaneously.

d) All reactor coolant pumps are restarted and then tripped simultaneously.

8. Resistance Temperature Detector (RTD) Bypass Flow Verification Test

a. Test Objective - This test will determine the flow rate necessary to achieve the required reactor coolant transport time in each RTD bypass loop to verify that the coolant transport times are acceptable, and to verify the low-flow alarm setpoint and reset for the total RTD bypass flow in each reactor coolant loop.

b. Acceptance Criteria

1) The RTD bypass loop transport time is less than 1.0 second or, if greater, is noted for comparison with results from unit trip testing at 100 percent power.

2) The low-flow alarm actuates at 90 $\pm$ 3 percent of full bypass loop flow.

c. Prerequisites

1) The reactor is in the hot standby condition with all reactor coolant pumps running.

2) All RTD bypass loop flow measurement instrumentation is calibrated and in service.

d. Method

1) The flow required to achieve the required reactor coolant transport time is determined by accurately measuring and recording the lengths of installed piping from the bypass loop inlet connections on each reactor coolant loop to the last downstream RTD of both hot and cold leg bypass loops and then calculating the flow necessary to achieve a 1.0 second transport time.

d. Method (con't)

2) Total bypass flowrate for each reactor coolant loop is measured and recorded, then the actual bypass loop transport time is calculated.

3) The low-flow alarm setpoint is verified by sequentially throttling the hot and cold leg manifold isolation valves in each loop and noting the flow when the alarm point is reached.

9. Reactor Protection System Trip Circuits Test

a. Test Objective - This test will verify that initial trip setpoint adjustments have been made prior to initial plant startup and to specify which trip setpoint adjustment will require readjustment during startup. This test will also verify proper operation of the trip circuitry and will obtain a record of all trip setpoints.

b. Acceptance Criteria

1) Initial reactor trip setpoints are verified to be in conformance with values in the Technical Specifications.

2) Setpoints readjusted during startup and testing are noted, and final record of all setpoints is obtained.

c. Prerequisites

1) Reactor trip instrumentation has been aligned and calibrated with setpoints adjusted to values given in the Technical Specifications or the plant test documents.

2) Reactor trip instrumentation has been energized for a time sufficient to achieve stability.

d. Method

1) Input for each automatic and manual trip is simulated, and proper trip response into the protection logic is verified.

2) All combinations of logic are simulated and proper response verified.

3) During startup operations, specific setpoints noted for readjustment on the data sheets are readjusted, and final setpoint values are recorded.

10. Pressurizer Effectiveness Test

a. Test Objective - This test will establish the continuous spray flow rate and will determine the effectiveness of the pressurizer normal control spray and of the pressurizer heaters.

b. Acceptance Criteria

1) For setting of the continuous spray flow, the flow through

b. Acceptance Criteria (1) con't

each bypass valve is adjusted to the minimum spray flow rate which results in a 200°F or less qT between the pressurizer and spray lines and which keeps the spray line low-temperature alarms clear.

2) For spray and heater response tests, the response to induced transient is within the banks assumed in the FSAR Safety Analysis.

c. Prerequisites

1) The RCS is in hot shutdown with normal operating no-load temperature and pressure.

2) All reactor coolant pumps are operating.

3) All banks of pressurizer heaters are operable.

d. Method

1) Adjust continuous spray valves until a minimum flow is achieved which maintains less than a 200°F temperature difference between the spray line and the RCS and until pressurizer heater cycling is minimized.

2) Check normal control spray effectiveness by spraying down to approximately 2,000 psig.

3) Check heater effectiveness by energizing all heaters with spray valves closed and spray and level controls in manual. Allow pressure to increase to approximately 2,300 psig.

11. <u>Water Quality Test</u>

a. Test Objective - This test will verify the acceptability of water quality of RCS fill and makeup water prior to initial critically.

b. Acceptance Criteria - All analyses are within the limits specified in the plant chemistry Specifications.

c. Prerequisites

1) The RCS is filled and vented in preparation for initial critically.

2) Reactor Makeup System water storage is at operating level.

3) Boric acid storage tanks are at operating level.

d. Method

1) Sample the RCS and analyze in accordance with approved plant procedures.

d. Method (con't)

2) Sample the Reactor Makeup System and analyze in accordance with approved plant procedures.

3) Sample the boric acid storage tanks and analyze in accordance with approved plant procedures.

12. Zero-Power Physics Tests

a. Test Objective - These tests will verify the basic nuclear characteristics of the reactor core by performing the following measurements:

1) All-rods-out, critical boron concentration

2) Onset of nuclear heat

3) Isothermal temperature coefficient

4) Differential and integral worth of the control rod banks

5) Differential boron worth at hot zero power

6) Integral control rod worth with one stuck rod

7) Ejected RCCA worth at hot zero power

b. Acceptance Criteria

1) The all-rods-out, critical boron concentration is within the limits specified in the fuel vendors core design report.

2) The isothermal temperature coefficient is negative under all conditions of critical operation.

3) Differential boron worth, over the range measured, is within the values assumed in the FSAR.

4) Control rod worth measurements verify that the insertion limits define in the Technical Specifications provide an acceptable shutdown margin under hot shutdown conditions with the most reactive RCCA stuck in the withdrawn position.

5) The worth of an ejected RCCA at hot zero power is less than or equal to the value used in the safety analyses.

c. Prerequisites

1) The RCS is in the hot zero-power condition with the reactor critical, with the neutron flux level in the source range as established in the initial critically sequence.

2) RCS temperature is being maintained.

3) Required signals for data collection and recording are available.

d. Method

1) The all-rods-out, critical boron concentration, is determined by measuring the just-critical boron concentration with the last controlling bank near the fully withdrawn position. The amount of reactivity worth of the controlling bank is then dynamically determined by withdrawal of the last bank, measuring the amount of reactivity inserted, and converting this value to an equivalent amount of boron.

2) The neutron flux level will be increased by outward control rod motion until temperature feedback effects are observed. The upper limit for zero-power physics testing is defined as approximately one decade below this level.

3) The isothermal temperature coefficient for various boron concentrations is obtained by dynamically measuring the reactivity change due to a temperature change in the primary system.

4) The control rod bank differential rod worth is determined by either borating the RCS while withdrawing the control banks or by diluting the RCS while inserting the control banks to maintain nominal system critically. Integral worth is then determined from the differential reactivity data. The integral worth will be used to verify the methodology used to predict the most reactive RCCA.

5) Differential boron worth at hot zero-power is determined by obtaining and analyzing reactor coolant samples for boron content in conjunction with control bank movement to maintain nominal critically during dilution or boration. Boron concentration as a function of time is used to plot reactivity versus boron concentration, the slope of which yields differential boron worth.

6) Integral control rod worth with one stuck rod is measured by achieving a configuration in which all banks are fully inserted except for the most reactive RCCA. Incremental rod worth measurements are made as the banks are inserted during boron dilution. Integral control rod worth is the same of the incremental reactivity measurements made in obtaining this configuration.

7) Ejected RCCA worth at hot zero-power is determined by obtaining a critical configuration with the sequenced rod banks at their insertion limit as defined in the Technical Specifications. The most reactive inserted rod is withdrawn to maintain nominal critically during boration. The reactivity addition is determined by summing the differential reactivity insertion as the rod is withdrawn to its fully withdrawn limit.

13. Natural Circulation Verification

a. Test Objective - This test will verify establishment of natural circulation in the primary system.

b. Acceptance Criteria

1) The primary coolant system can be circulated by natural circulation with no coolant pumps operating.

c. Prerequistes

1) Reactor coolant pumps operating

2) Steam generators being fed by normal feedwater supply (AFW)

3) Pressurizer heaters controlling pressure

4) Reactor at approximately 3 percent

5) Normal primary system temperature and pressure

d. Method

Place the plant in natural circulation mode observing the length of time for plant to stabilize, flow distribution, power distribution, and ability to maintain cooling mode. Core exit thermocouples will be monitored to assess core flow distribution.

14. Radiation Survey Test

a. Test Objective - This test will verify shielding effectiveness by measuring neutron and gamma radiation dose levels at selected points throughout the plant.

b. Acceptance criteria

1) Measured neutron and gamma radiation levels are within the limits of 10CFR20 for the zone designation of each area surveyed.

c. Prerequisites

1) Reactor is critical at various power levels from zero to 100 percent as specified.

2) Neutron and gamma radiation survey instruments have been calibrated against known sources.

d. Method

1) In accordance with procedures for neutron and gamma radiation surveys, dose levels are measured at points throughout the plant with the power less than 5%.

d. Method (con't)

2) At reactor power levels approximately 50 and 100 percent, measurements are repeated.

15. Nuclear Instrumentation Calibration Test

a. Test Objective - This test will:

1) Determine the linearity and uniformity of power-range detector output.

2) Calibrate the power-range channels to reflect actual power levels.

3) Determine that excore instrumentation can detect axial flux differences.

4) Obtain Nuclear Instrumentation System channel overlap data.

5) Obtain baseline data for fuel pin and core barrel movement using the vibration and loose parts monitoring system.

b. Acceptance criteria

1) The power-range channels display linear output over the normal operating range.

2) The power-range channels accurately reflect heat balance data.

3) Overlap data is obtained on power-level changes through the source, intermediate, and power ranges.

4) qT setpoint adjustments are entered in accordance with the test procedure.

c. Prerequisites

1) The reactor is at the stable, steady-state power level specified by the test procedure.

2) Pre-critical nuclear and temperature instrumentation calibration has been successfully completed.

d. Method

1) The tests described below are requested at power levels of approximately 30, 50, 75 and 100 percent:

a. Acceptable power-range output is determined by measuring and plotting power-range detector currents versus power level. From these plots, the linearity of each power-range channel, the degree of uniformity between power-range channels, and the ability of the excore instrumentation to detect axial flux differences are determined.

d. Method (con't)

b) The gain of each power-range channel is adjusted to correspond to the results of the heat balance calculations.

c) Source-, intermediate-, and power-range channel outputs during power-level changes are measured, recorded, and plotted to establish channel overlap.

d) Baseline data for fuel pin and core barrel movement is obtained using the core internals channel of the vibration and loose parts monitoring system.

16. Effluent Process and Area Radiation Monitor Test

a. Test Objective - This test will verify the performance of the effluent, process and area monitors under actual operating conditions.

b. Acceptance Criteria

1) The installed effluent and process monitors indicate the radioactive content of the effluent or process fluid as verified by independent laboratory analysis.

2) Area radiation monitors properly indicate radiation levels confirmed by exposure to a field calibration check source.

c. Prerequisites

1) The reactor has been operating at the stable, steady-state power level specified in the procedure for a time sufficient to generate representative effluents and process samples.

2) The effluent, process and area monitors have been calibrated against known sources.

d. Methods - The test described below will be conducted at power levels less than 5 and approximately 30%.

1) Following plant procedures, the suitability of effluents for discharge is verified by radiochemical analysis.

2) Discharge is commenced, and the response of effluent monitors is observed and recorded.

3) By radiochemical analysis of the process and effluent samples, confirm the satisfactory performance of the process and effluent monitors.

4) Area radiation monitor detectors will be exposed to field calibration check sources at several levels in the range of the instrument. Area radiation monitor readings will be compared to those expected from the check source.

17. Flux Distribution Measurements with Normal Rod Pattern Test

    a. Test Objective - This test will verify that the hot-channel factors are less than or equal to design safety limits.

    b. Acceptance Criteria - Flux distribution measurement analysis yields hot-channel factors less than or equal to Technical Specification Limits.

    c. Prerequisites

        1) Reactor is critical at a steady-state power level of approximately 3 to 5 percent.

        2) The Incore Instrumentation System preoperational test is complete, and the system is operable.

        3) The computer is operable as required for incore map processing.

    d. Method - The reactor power level is stabilized, and complete incore flux maps are obtained and processed.

18. Axial Xenon Oscillation Test

    a. Test Objective - This test will demonstrate the stability of the 3,800-MWT core to axial xenon oscillations.

    b. Acceptance Criteria - The reactor core stability index is less than or equalto the value specified in the fuel vendors core design report for axial xenon oscillations.

    c. Prerequisites

        1) The reactor is critical at a steady-state power level of approximately 75 percent.

        2) Pertinent data to be monitored is specified and connected to recording devices as required by the test procedure.

    d. Method

        1) Axial xenon oscillations are introduced by a specified maneuvering of control rod banks over a specified time period.

        2) Data is recorded and analyzed as required in the test procedure.

19. Power Coefficient and Power Defect Measurement Test

    a. Test Objective - This test will determine the differential power coefficient of reactivity and the intergral power defect.

    b. Acceptance Criteria

        1) The differential power coefficient is equal to or more conservative than the power coefficient assumed in the safety analysis.

b. Acceptance Critera (con't)

2) The measured power defect agrees within ± 10% of the value shown in the fuel vendors core design report.

c. Prerequisites

1) The reactor is critical at specified power levels from zero to 100 percent.

2) The instrumentation necessary for data collection is installed, calibrated, and operable.

d. Method

1) Reactor power is maintained congruent with turbine load demand by control bank adjustment throughout the range of each load change from hot zero-power to the hot, full power condition.

2) Reactivity increments due to periodic control bank steps are determined and recorded throughout the load change.

3) At power levels of approximately 30, 50, 75 and 80 percent conditions are stabilized, and a heat balance is obtained to accurately determine core power.

4) Power coefficient and power defect are calculated with data obtained from hot zero power to hot full power.

20 Plant Response to Load Changes Test

a. Test Objective - This test will verify the plant response to plant dynamic response to design ramp load changes.

b. Acceptance Criteria - Successful response of the plant systems to plant dynamic response to design ramp load changes is delineated below:

1) No reactor trip.

2) No safety injection initiation.

3) No steam line safety or relief valve operation.

4) No pressurizer safety or relief valve operation.

5) Nuclear power overshoot/undershoot is less than 3% for load increase/decrease.

6) No manual intervention required to stabilize plant systems.

7) Plant variables (i.e., Tavg, pressure, feed flow, steam flow, etc.) do not incur sustained or diverging oscillations.

c. Prerequisites

1) Reactor is critical at various power levels from 30 to 100 percent as specified.

2) Instrumentation is installed and calibrated for recording specified parameters.

3) All systems are in their automatic mode of operation.

d. Method

1) Step load changes of ±10 percent at 200 percent per minute are introduced at power levels of approximately 30, 50, and 75 percent. A 10 percent step load reduction at 200 percent per minute will also be made from 100 percent power.

2) Load reductions of 50 percent are performed from approximately 75 and 100 percent, at 200 percent per minute.

3) Plant trips are performed from power levels up to 100 percent as specified in the procedure.

21. Rod Control System At-Power Test

a. Test Objective - This test will verify the performance of the Rod Control System.

b. Acceptance Criteria - With final setpoints, the rod Control system provides response in accordance with STP setpoints document during a reactor coolant system temperature transient.

c. Prerequisites

1) The reactor is at an equilibrium condition at approximately 30 percent power.

2) The Rod Control System is in manual control, and RCCA's are in the maneuvering band for the existing power level.

3) Signals from parameters affecting automatic control are connected to recorders.

d. Method

1) With the average reactor coolant temperature within ±2°F of the reference reactor coolant temperature, the Rod Control System is placed in automatic.

2) System response is observed during a period sufficient to assure proper control during steady-state conditions.

3) The Rod Control System is placed in manual, and the average reactor coolant temperature is elevated to 6°F greater than the reference reactor coolant temperature.

d. Method (con't)

4) The Rod Control System is returned to automatic, and system response is observed and recorded.

5) With the average reactor coolant temperature initially 6°F lower than the reference reactor cooplant temperature, the test is repeated.

6) Setpoints are adjusted as necessary, and the test is repeated.

22. Evaluations of Core Performance Test

a. Test Objective - This test will verify that core performance margins are within design predications for expected normal abnormal rod configurations.

b. Acceptance Criteria

1) Sufficient data has been collected so that the following core performance margins can be established to be within safety analysis predictions:

a. Flux distributions

b. Local surface heat flux

c. Linear heat rate

d. Departure from nucleate boiling ration

e. Radial and axial power peaking factors

f. Quadrant power tilt

2) Nuclear and temperature instrumentation is responsive to reactor conditions, both changing and steady state.

c. Prerequisites

1) Reactor is critical at various power levels from zero to 100 percent as specified.

2) Data-recording instrumentation is calibrated and operable.

d. Method

1) At steady-state power points of approximately 30, 50, 75, 90 and 100 percent, incore data are obtained and analysis is performed.

2) Data or measurements to be recorded include:

a) Power-range detector currents versus power level

b) Secondary heat balance and adjustment of power-range channel gain

2) Data or measurements to be recorded include: (con't)

   c) RTD values and qT amplifier outputs

   d) Excore detector signal voltages versus currents

   e) Overlap data for power and intermediate ranges

   f) Data for calibration of steam and feedwater flow instruments

22. <u>Evaluations of Core Performance Test</u>

   a. Test Objective - This test will verify that core performance margins are within design predictions for expected normal and abnormal rod configurations.

   b. Acceptance Criteria

      1) Sufficient data has been collected so that the following core performance margins can be established to be within design predictions:

         a. Flux distribution

         b. Local surface heat flux

         c. Linear heat rate

         d. Departure from nucleate boiling ratio

         e. Radial and axial power peaking factors

         f. Quadrant power tilt

      2) Nuclear and temperature instrumentation is responsive to reactor conditions, both changing and steady state.

   c. Prerequisites

      1) Reactor is critical as various power levels from zero to 100 percent as specified.

      2) Data-recording instrumentation is calibrated and operable.

   d. Method

      1) At steady-state power points of approximately 30, 50, 75, 90 and 100 percent, incore data are obtained analysis is performed.

      2) Data or measurement to be recorded include:

         a) Power-range detector currents versus power level

         b) Secondary heat balance and adjustment of power-range channel gain

2) Data or measurement to be recorded include: (con't)

   c) RTD values and qT amplifier outputs

   d) Excore detector signal voltages versus currents

   e) Overlap data for power and intermediate ranges

   f) Data for calibration of steam and feedwater flow instruments

23. Full Load Rejection Test

   a. Test Objective - This test will demonstrate the ability of the plant to sustain a trip of the main generator from 100 percent and to evaluate the interaction between control systems and system responses to the transient.

   b. Acceptance Criteria

      1) Safety injection is not initiated.

      2) Main steam and pressurizer safety valves do not lift.

      3) Recorded parameters and observed transient results are compared to the predicted results. Quantitative values for the required convergence of actual test results and predicted values will be provided in the detailed test procedure.

      4) No safety limits are exceeded.

   c. Prerequisites

      1) Specified control systems are in the automatic mode and functioning properly

      2) The reactor is at steady-state full power with the rods in the maneuvering band.

      3) Pressurizer and main safety relief valves are operable.

      4) Parameters to be connected to recording devices will be specified in the detained test procedure and will include:

         a) Nuclear Flux

         b) Cold leg temperature

         c) Hot leg temperature

         d) Tavg

         e) Pressurizer level

         f) Pressurizer pressure

4) Parameters to be connected to recording devices will be specified in the detained test procedure and will include: (con't)

g) Steam pressure

h) Steam generator levels

d. Method

1) The main generator is manually tripped such that it is subjected to the maximum credible overspeed condition.

2) During transient, the following control functions will be observed:

a) Rod Control System

b) Reactor Protection System

c) Pressurizer Pressure Control System

d) Steam Generator Level Control System

e) Steam Dump Control System

3) Following the transient, recorded data and control function response are evaluated and compared to the predicted results.

24. Loss of Offsite Power Test

a. Test Objective - This test will verify that upon a loss of offsite power, the plant can be maintained in a safe, hot shutdown condition in natural circulation for approximately 30 minutes.

b. Acceptance Criteria

1) Turbine and reactor trips function as described in the FSAR.

2) Emergency power systems function as described in the FSAR.

3) The plant is operated in a stable condition in natural circulation using batteries and emergency diesels.

c. Prerequisites

1) The plant is at a steady-state power level equal to or greater than 10 percent of rated generator load.

2) Pressurizer and main steam safety and relief valves are operable.

3) Pertinent parameters to be measured are connected to recording devices.

24. Loss of Offsite Power Test (con't)

d. Method

1) Switchyard circuit breakers connecting the unit to the Offsite Power Distribution System are manually placed in a the tripped position.

2) The manual reactor plant trip is actuated with subsequent turbine trip.

3) Starting of the emergency diesels, stripping of vital buses, and sequencing of emergency loads on the vital buses are observed for proper operation for approximately 30 minutes.

25. Shutdown from Outside the Control Room Test

a. Test Objective - This test will demonstrate the capability to shut down the unit from outside the control room.

b. Acceptance Criteria

1) The reactor trips.

2) The turbine generator trips.

3) A stable hot standby condition is established and maintained for at least 30 minutes.

c. Prerequisites

1) Control systems are functioning properly.

2) Turbine generator power output is equal to or greater than 10 percent.

3) All required communications circuits are operational

d. Method

1) Evacuation of the main control room is simulated by dispatching personnel to their assigned stations while additional operators occupy the control room to observe plant behavior.

2) The reactor is tripped at the reactor trip switchgear.

3) The plant is maintained in the hot standby condition by manipulation of local controls and observation of local indications for at least 30 minutes.

26. Dynamic Rod Drop Test

a. Test Objective - this test will verify the operation of the negative rate trip circuitry in detecting the simultaneous insertion of two RCCA's.

26. Dynamic Rod Drop Test (con't)

b. Acceptance Criteria

1) The reactor trips as a result of the negative rate trip.

2) Steam generator and pressurizer safety valves do not lift.

3) Safety injection is not initiated.

c. Prerequisites

1) All power-range nuclear instrumentation channels are operable.

2) The reactor is at the steady-state power level of approximately 50 percent with the controlling bank near the full-power insertion limit.

3) Pertinent parameters to be measured are connected to recorders.

d. Method

1) Two of the least reactive rods from the group most difficult to detect by excore detectors due to low worth and core location are simultaneously dropped by removing voltage to both the moveable and stationary gripper coils of the designated rods.

2) Following the transient, recorded data is evaluated for system and instrumentation response.

27. Static RCCA Drip and RCCA Below-Bank Position Measurements Test

a. Test Objective - this test will obtain the differential and integral worth of the most reactive below-bank RCCA, will demonstrate the repsonse fo the nuclear incore instrumentation to a RCCA below the nominal bank position, and will determine hot-channel factors associated with this misalignment.

b. Acceptance Criteria

1) Hot-channel factors are within FSAR safety limits when the unit RCCA is completely misaligned.

2) The excore and/or incore instrumentation will detect a misaligned RCCA when the misalignment is outside the technical specification limits.

3) Misalignment within the limits of the rod position indicators will not cause a power maldistribution outside the technical specification limits.

4) A three percent reduction in rated thermal power for each percent tilt, for tilts in excess of that allowed by the Technical Specifications, maintains $F_Q(Z)$within the allowed value in the Technical Specifications.

27. Static RCCA Drip and RCCA Below-Bank Position Measurements Test (con't)

c. Prerequisites

1) All power-range nuclear instrumentation channels are operable.

2) Incore instrumentation is operable.

3) The reactor is at a steady-state power level of approximately 50 percent.

d. Method

1) Single rod movement is accomplished by disconnecting the lift coils of all rods in the affected bank except for the selected rod. A high worth RCCA will be selected.

2) The differential worth of the rod is determined by making a series of step adjustments in rod position to maintain nominal system critically during a continuous, controlled RCS dilution. The flux-level response to the step change in reactivity is translated to equivalent reactivity. Differential and integral worths are calculated from this reactivity.

3) During rod insertion, power-range detector currents, thermocouple maps, and incore detector traces are periodically recorded.

4) The power-range detector data provides information to relate core quadrant tilt to rod position.

5) The thermocouple maps, in conjunction with moveable incore detector traces, provide data necessary to determine hot-channel factors and core axial and radial power distributions as a function of rod position.

6) The rod will be returned to its proper bank position and all lift coils will be reenergized.

28. Pseudo Rod Ejection Test

a. Test Objective - This test will verify ejection rod worth and hot-channel factors assumed in the safety analysis and will demonstrate the response of nuclear and incore instrumentation to an RCCA above the nominal bank position and to an ejected rod.

b. Acceptance Criteria

1) The worth of the ejected rod and the hot-channel factors, with measurement uncertainty, are less than or equal to those assumed in the safety analysis.

2) The excore and/or incore instrumentation will detect a misaligned RCCA when the misalignment is outside the technical specifications limits.

28. Pseudo Rod Ejection Test (con't)

c. Prerequisites

1) All power-range nuclear instrumentation channels are operable.

2) Incore instrumentation is operable.

3) Reactor is critical at a steady-state power level of approximately 30 percent with the controlling bank at approximately the full-power insertion limit.

d. Method

1) Single rod movement is accomplished by disconnecting the left coils of all rods in the affected bank except for the selected rod.

2) The differential worth of the rod is determined by making a series of step adjustments in rod position to maintain nominal system critically during a continuous, controlled RCS boration. The flux-level repsonse to the step change in reactivity is translated to equivalent reactivity. Differential and integral worths are calculated from this reactivity.

3) During rod withdrawal, power-range detector currents, thermocouple maps, and incore detector traces are periodically recorded.

4) The power-range detector data provides information to relate core quadrant tilt to rod position.

29. Chemistry and Radiochemistry Test

a. Test Objective - This test will demonstrate that the chemical and radiochemical requirements of the reactor coolant system and the secondary coolant system can be maintained in accordance with Technical Specification requirements.

b. Acceptance Criteria - Measured primary and secondary coolant chemistry and radiochemistry are within the limits required by Technical Specifications at 0, 30, 50, 75, and 100 percent power.

c. Prerequisites

1) Chemical and volume control system is lined up for normal operation.

2) The primary sampling system is operable.

3) Steam generator blowdown is lined up for normal operation.

4) The reactor is at the specified steady-state power level.

29. Chemistry and Radiochemistry Test (con't)

d. Method

1) The primary system chemistry will be monitored before those parameters required by technical specifications at 0, 30, 50, 75, and 100 percent.

2) Steam generator blowdown will be monitored to detect any activity in the secondary system.

30. RCS Loose Parts Monitoring Test

a. Test Objective - This test will provide baseline data for the reactor coolant system loose parts monitoring system (LPMS).

b. Acceptance Criteria - Baseline data obtained for all channels of the LPMS at power levels of approximately 30, 50, 75, and 100 percent.

c. Prerequisites

1) Reactor is at the stable, steady-state power level specified by the test procedure.

2) Instrumentation necessary for data collection is installed, calibrated and operable.

d. Method

1) With the reactor power at the prescribed power levels, LPMS baseline data will be obtained at center frequencies of 25 Hz, 250 Hz, 2.5 kHz and 25 kHz.

31. Feedwater Temperature Reduction Test

a. Test Objective - To demonstrate that the dynamic response of the plant is in accordance with design for the bypassing of the low-pressure feedwater heaters.

b. Acceptance Criteria - The reduction in feedwater temperature will result in an increase in heat load on the primary of less than 10 percent of full power.

c. Prerequisites

1) The reactor is operating at the steady-state power level of approximately 50 and 90 percent as specified in the approved test procedure.

2) Pertinent parameters to be measured are connected to recorders.

d. Test Method

1) The low-pressure heater bypass valve is opened to cause a reduction in feedwater temperature.

d. Test Method (con't)

2) Following the increased power transient, recorded data are evaluated for plant repsonse.

32. Automatic Steam Generator (SG) Level Control Test

a. Test Objective - This test will demonstrate the ability of the FW system and FW heater and heater drip systems to perform their design functions by performing the following testing:

1) Demonstrate the proper operation of the turbine driven FW pumps and the pumps speed controllers.

2) Demonstrate the level control stability of the SG FW bypass valves.

3) Demonstrate the stability of the SG level control when transferring control from the flow bypass valves to the main FW valves.

4) Demonstrate proper response of the automatic SG level control system during plant transients at power levels approximately 20, 30, 50, 75 and 100 percent.

5) Verify proper automatic programming of the SG level during power escalation.

6) Demonstrate proper operations of the heater drip system by placing it in service at the appropriate design power level.

b. Acceptance Criteria

1) The FW pumps meet or exceed design flow and pressure requirements.

2) The FW pumps discharge pressure oscillations are within the allowable limits in automatic speed control.

3) The main FW control valve stem positions shall stabilize within design limits for the various steam flow conditions.

4) SG level overshoot or undershoot must be less than the design limit following a level increase or decrease.

5) SG level should return to and remain within a design limit of the reference value following transfer of level controls from manual to automatic.

6) SG level should return to and remain within the design limit of the level setpoint following a level or level setpoint change.

7) The FW heaters functions per design.

8) The heater drip pumps meet their design flow and pressure requirments.

32. Automatic Steam Generator (SG) Level Control Test (con't)

c. Prerequisites

1) All FW system and heater drip system instrumentation has been calibrated and is operable.

2) Reactor is critical initially at a 5 to 10 percent power level.

3) Turbine generator is on steam slow roll.

4) The RCS is initially in manual control.

5) The variable speed FW pump speed controller is in manual control.

6) The instrumentation required for data collection is installed, calibrated, and operable.

7) The FW pumps are operating in the recirculation mode.

d. Method

1) For each individual SG, with the level controller in manual raise and lower the setpoint approximately 5 percent above and below the normal operating level setpoint, switch the controller to automatic and verify the ability of the controller to control the water level and its stability.

2) With all SG level controls in automatic, increase power to approximately 20 percent and verify level is controlled to the proper level.

3) Individually transfer each steam generator FW bypass valve to the main FW control valve and verify it controls the SG level at its proper level.

4) At the appropriate design power level, place the heater drip system in operation and verify it performs per design requirements.

5) When power level is increased to 30 percent, verify that the FW pump discharge pressure versus the steam header pressure is maintained at the correct pressure difference for each of the FW pumps, one at a time; verify that each pump's automatic speed controller is stable within design limits and that the level controller response performs per design requirements in conjunction with Startup Test procedure No. 20 (Plant Response to Load Change Test - Method d.1).

6) Verify that the FW pump speed controller and the SG level controller provide system repsonse and stability within design requirements in conjunction with Startup Test procedure no. 20 (Plant Response to Load Changes Test - part d.1)at power levels of 50, 75, and 100 percent.

d. Method (con't)

7) Verify that the FW pump speed controller and SG level controller provide system response and stability within design requirements in conjunction with Startup Test Procedure No. 20 (Plant Re.ponse to Load Change Test - part d.2) at power levels at 75 and 100 percent.

34. Control of Margin to Saturation Test

a. Test Objective - This test will:

1) Determine the depressurization rate of the RCS without pressurizer heaters.

2) Determine the depressurization rate of the RCS with auxiliary spray.

3) Measure the effect of changes in charging flow on temperature saturation (Tsat).

4) Measure the effect of changes in steam flow on Tsat.

b. Acceptance Criteria

1) The RCS depressurization rate following loss of pressurizer heaters is determined.

2) The effects of charging flow and steam flows on saturation margins are demonstrated.

c. Prerequisites

1) The RCS is in the shutdown condition with normal operating no-load temperature pressure.

2) One RCP operation (RCP is not to be in loops with pressurizer surge line or spray lines.)

d. Method

1) Reduce pressure by turning off pressurizer heaters noting depressurization rate.

2) Re-establish heaters and reduce pressure further by use of auxiliary spray noting depressurization rate and effect on margin to saturation temperature.

3) At reduced pressure observe the effects of changes in charging flow and steam flow on margin to saturation temperature.

STP FSAR

Question 423.1

State the number of personnel to be assigned, by job position and approximate schedule, relative to fuel loading of Unit 1, for staffing of the Startup Group.

Response

Section 14.2.2.1 identifies the key Startup personnel and their responsibilities within the Startup organization. The total number of personnel to be assigned is based on the testing activities scheduled to be accomplished to meet the fuel load date. The entire Startup organization is described in the Startup manual.

Startup plans to have a staff of approximately 190-200 Startup Engineers by the end of 1985 with a group of approximately 175 support personnel from NPOD.

Question 423.2

Clarify the responsibility, authority, and minimum qualifications for the "Test Supervisors." The following items should be modified as necessary: Section 14.2.2.2, item 2n states that the Lead Startup Engineer functions as a test supervisor; Section 14.2.2.2, item 3c states that the Startup Engineer conducts tests; Section 14.2.4.2 states that the Test Supervisor signs off prerequisites prerequisites, prior to beginning tests; and Section 14.2.4.4 states that the Test Supervisor is charged with overall responsibility for conducting tests.

Response

Section 14.2.2.1 provides the description of the startup organization and the supervisors who will, as authorized by the Startup manager, direct testing. This includes procedure preparation, test conduct, data review, coordination with operations, etc.

See the rewrite of Section 14.2.2.2 for the NPOD organization.

STP FSAR

Question 423.3

Define "minor" and "major" changes to test procedure and clearly describe the approvals required for each type prior to resuming the test for both preoperational and startup tests.

Response

Section 14.2.4.1 states that required changes to the preoperational test procedures will be made in accordance with the Startup Manual. The Startup Administrative Instruction that controls preoperational test procedures and conduct requires a "Test Change Notice" be prepared for revisions to the procedure. The notice will be approved by the Startup Manager. The use of the term "minor" and "major" has been deleted from tne Startup Manual.

Section 14.2.4.3 states that the method that will be used to change initial Startup test procedures.

Question 423.4

Describe your controls that will assure that a review of all proposed facility modifications, which are necessitated by a failure to meet acceptance criteria of preoperational or startup tests, will be performed by the original design organization or other designated design organizations.

Response

Section 14.2.5 requires a review of preoperational and initial startup test results by the Joint Test Group or Plant Operations Review Committee. The review may result in modification to the design. The design change will be prepared by Bechtel Energy Corporation or other design organization designated by HL&P. Results of retests due to facility modifications are reviewed and approved in the same manner as the original procedure.

Question 423.5

List each preoperational test which you do no intend to complete (and review the results of) prior to fuel loading. For each test: (1) state which portions of the test will be delayed until after fuel loading: (2) provide technical justification for delaying these portions; and (3) state when each test will be completed (key to operating modes defined in your technical specifications, or to power levels during your power ascension phase as defined in Chapter 14). Note that any test that you do not intend to begin prior to fuel loading should be included in your startup test phase instead of the preoperational test phase.

Response

See Revised Section 14.2.5.

Question 423.6

Modify Section 14.2.5 as necessary to provide assurance that the listed test plateau will be reached in order of ascending power level and that the testing, review, and approval that is specified for each plateau will be performed before raising power to the next plateau.

Response

See revised Section 14.2.5.4.

Question 423.7

The staff's review of your initial test program will include a comparison of your individual test descriptions with the appendices of Regulatory Guide 1.68 and the other regulatory guides which they reference. therefore, modify your FSAR to specifically address each exception to these appendices and the regulatory positions of the referenced guides and provide technical justification and/or proposed alternatives for each exception.

Response

Section 14.2.7 states that the Reg. Guides to be used in the development of the initial test program are listed in Chapter 3 Table 3.12-1.

Section 14.2.12.2 lists the safety related systems that will be preoperational tested and those that will have acceptance tests conducted on them. It is intended that this will conform to Reg. Guide 1.68 and the guides referenced therein. Exceptions are noted in Chapter 3 Table 3.12-1.

Question 423.8

Clarify Section 14.2.8 to clearly state; (1) that your study of operating and testing experiences at other reactors will be performed in sufficient time to permit the findings to be incorporated in your test program; and (2) that your study will cover at least the previous two-year period of operating and testing experience.

Response

See revised Section 14.2.8.

Question 423.9

Regulatory Guide 1.68, Revision 1, states that test procedures should be available for examination by I&E inspectors 60 days prior to performances of the test and not less than 60 days prior to fuel loading. Your FSAR states that the test procedures will be available for examination 30 days prior to performance and 60 days prior to fuel loading. Provide justification for making test procedures available less than approximately 60 days prior to performance of each test.

Response

Section 14.2.11 states that procedures will be available to the NRC at least 60 days prior to scheduled use in the field and not less than 60 days prior to fuel loading.

Question 423.10

In order to facilitate the staff's review of your individual test descriptions, provide an index of preoperational and startup test descriptions.

Response

Section 14.2.12 provides the listing of preoperational/acceptance and startup test description.

Question 423.11

In order to complete our review of the organization and staffing for the test program, we required that you provide the minimum qualification requirements (educational, overall technical experience, and nuclear experience) for the following categories of personnel at the time they are assigned to the task. Your response should address all personnel performing the tasks listed and should not be limited to only STP personnel (e.g., Brown & Root and Westinghouse augmenting personnel). Note that ANSI N45.2.6, although applicable to some categories of personnel during the construction, preoperational, and startup phases, was not intended to cover personnel in the categories listed below.

1. Personnel that supervise or direct the conduct of individual preoperational tests.

2. Personnel that review and/or approve preoperational test procedures.

3. Personnel that approve preoperational test results.

4. Personnel that supervise or direct the conduct of individual startup tests.

5. Personnel that review and/or approve startup test procedures.

6. Personnel that approve startup test results.

Current staff recommendations on qualification of these individuals are included in regulatory position 3 of proposed Revision 2 to Regulatory Guide 1.8, February 1979 (issued for comment). Revise Section 14.2.2.8 accordingly.

Response

Certification of personnel involved in the Startup organization is detailed and controlled by the Startup manual. Section 14.2.2.8 states a commitment to Reg. Guide 1.58. The education, training and experience requirements for those who conduct initial startup testing are detailed in FSAR Chapter 13 "Conduct of Operations".

Question 423.12

Describe the training or indoctrination in administrative controls to be given to personnel who will participate in the initial test program.

Response

Personnel performing Preoperational Testing are required to be certified. The Startup Manual establishes the training and indoctrination required to be completed prior to being certified. The training in administrative controls to be given to personnel who will participate in initial startup testing is described in Section 14.2.2.2.6.

Question 423.13

Modify the test procedure format (Section 14.2.3.1) to include Environmental Conditions and Documentation of Test Results as described in Appendix C of Regulatory Guide 1.68.

Response

1. Environmental conditions will be included as either a prerequisite or an initial condition as required or appropriated. If, during the conduct of a test, an environmental condition must be established, then the necessary steps to establish the condition will be included in the detailed test procedure section.

2. The documentation of test results is incorporated into the actual test procedure at the time the test is being performed. Following the completion of the test, the test supervisor will write a test report per Section 14.2.5.

Question 423.14

In Section 14.2.4..4, 2(a), identify the "responsible supervisory personnel" who are authorized to approve minor changes.

Response

Section 14.2.4.1 states that administrative controls of the test program are included in the Startup Manual which includes changes to preoperational procedures.

See revised Section 14.2.4.3 for changes to initial startup test procedures.

See revised Section 14.2.4.1 for changes to preoperational test procedures.

Question 423.15

Your response to question 423.4 is not entirely adequate. Revise Section 14.2.5 and Section 14.2.4.3 as necessary to indicate that a review of all proposed modifications and determination of retest requirements will be conducted by the original design organization or other designated design organization. Describe the review to be conducted after a work request has been returned to the Startup Group, and describe the reviews given an FREA by personnel other than the Startup Engineer.

Response

Section 14.2.5 requires a review of preoperational and initial startup test results by the Joint Test Group or Plant Operations Review Committee. The review may result in modification to the design. A required design change will be prepared by Bechtel Energy Corporation or other design organization designated by HL&P. Results of retests due to facility modifications are reviewed and approved in the same manner as the original procedure.

Question 423.16

Describe the administrative controls that will ensure the required continuity between the STP Startup Group and STP plant staff in the transition between Phase II an Phase II testing. Include the number of persons in the plant staff involved in Phase III testing, the augmentation of these persons from the Startup Grcup or outside contractors, and the additional training that they will receive to familiarize them with previous test activities and administrative controls.

Response

See Sections 14.2.2, 14.2.2.2.6 and 14.2.4.1.

Question 423.17

Section 14.2.7 indicates that exceptions have been taken to Regulatory Guides 1.52, 1.80, and 1.108. Modify this section to indicate the following:

1. A review of the appropriate sections of Chapters 6 and 9 of your FSAR did not reveal any exceptions to the regulatory positions of Regulatory Guide 1.52 that deal with preoperational or startup testing (Regulatory Positions 5a, b, c, and d). Confirm that no exceptions have been taken to these positions. Exceptions to other portions of the regulatory guide will be evaluated by the cognizant NRC reviewer.

2. Appendix A to 10CFR part 50, General Design Criterion 10, requires that the reactor core and associated coolant, control, and protective systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effect of anticipated operational occurrences. In addition, Criterion 12 requires that control systems be designed to assure that power oscillations that can result in conditions exceeding specified acceptable fuel design limits are not possible or can be detected and suppressed. Therefore, we require that you conduct a test to confirm that the response of the reactor and associated systems is consistent with the requirements of General Design Criteria 10 and 12 on a loss of the compressed air system. The staff guidelines for preoperational testing of the compressed air system are given in Regulatory Guide 1.80, "Preoperational Testing of Instrument Air System", Revision 0, June 1974.

3. Section 3.12 of the FSAR indicates that Regulatory Guide 1.108 is not applicable to your facility due to the implementation date. The implementation section of Regulatory Guide 1.108, Revision 1, August 1977, clearly states that the guide represents current staff practice and will be used to evaluate applications. We therefore conclude that Regulatory Guide 1.108 is applicable to your facility. Modify your FSAR to address how your initial test program will comply with Regulatory Positions C.2.a and C.2.b.

Response

1. See revised Section 14.2.7. No exceptions have been taken to the testing portions of Regulatory Guide 1.52.

2. The testing of the Instrument Air System will be classified as Acceptance Tests since the systems are not safety-related. Operation of the two systems is not required to assure any of the following:

<u>Response</u> (con't)

a) The integrity of the reactor coolant pressure boundary.

b) The capability to shutdown the reactor and maintain it in a safe shutdown condition.

c) The ability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the guideline exposures of 10CFR100.

The statements above are further evaluated in Section 9.3.1. Monitoring of the failure mode of each pneumatic valve upon loss of air occurs during the calibration and functional check of each valve and is a prerequisite for the preoperational test of the system.

Based upon the above safety evaluation and the unlimited possible number of operating conditions and possible failure modes it is not practical to attempt nor will any significant benefit be derived from attempting to simulate all the possible combinations of line breaks or freezing.

3. STP will comply with the intent of Reg. Guide 1.108 with the interpretations and exceptions presented in FSAR Section 8.3.1.2.10.

Question 423.18

Expand the information in Section 14.2.10.1, Initial Fuel Load, to address the following items, as indicated in Appendix C of Regulatory Guide 1.68:

1. Composition, duties, and emergency procedure responsibilities of the fuel handling crew - 2.1(1).

2. Evacuation alarm and ventilation control - 2.a(2).

3. Completion of fuel inspection - 2.a(4).

4. Response checks of neutron monitors - 2.a(6).

5. Status of vessel internals - 2.a(8).

Response

See revised Section 14.2.10.1.

Question 423.19

Expand the information in Section 14.2.10.2, Initial Criticality, to indicate:

1. That critical rod position and boron concentration will be calculated and what action will be taken if the estimates are exceeded.

2. Required neutron instrument calibration and minimum count rate prior to beginning the approach to initial criticality.

Response

See revised Section 14.2.10.2.

Question 423.20

Provide sufficient information in Section 14.2.11.2, Test Program Schedule, to ensure that the overlap of test schedules between Unit 1 and Unit 2 and the resultant shifting of Startup Engineers will not create significant divisions of responsibilities or dilutions of the testing staff (i.e., anticipated number of engineers shifted, whether they will work on both units simultaneously, and the organizational structure and administrative controls involved).

Response

See revised Section 14.2.11.

Question 423.21

Provide assurance in Chapter 14 that, insofar as practical, the test requirements will be completed prior to exceeding 25 percent lower power for systems relied on to prevent, to limit, or to mitigate the consequences of postulated accidents, and that the safety of the plant will not be totally dependent on the performance of untested systems.

Response

See revised Section 14.2.5.4.

STP FSAR

Question 423.22

Our review of your test program description disclosed that the operability of several of the systems and components listed in Regulatory Guide 1.68 (Revision 2) Appendix A may not be demonstrated by your initial test program. Expand your test description to address the following listed items:

1. Preoperational Testing

1.a(2) (a)	-	Pressurizer
1.a(2) (b)	-	Pumps, motors, and associated power sources
1.a(2) (c)	-	Steam generators
1.a(2) (d)	-	Pressurizer relief valves and supports and restraints
1.a(2) (e)	-	Main steam isolation valves
1.a(2) (g)	-	Instrumentation used for monitoring system performance or performing permissive or prohibit interlock functions.
1.a(2) (h)	-	Reactor vessel and internals
1.a(2) (i)	-	Safety valves
1.a(3)	-	Vibration tests
1.a(4)	-	Pressure boundary integrity test
1.d(1)	-	Turbine bypass valves
1.d(2)	-	Steam line atmospheric dump valves
1.d(3)	-	Relief valves
1.d(4)	-	Safety valves
1.d(9)	-	Condensate storage system
1.e(1)	-	Steam generators
1.e(5)	-	Steam extraction system
1.e(10)	-	Feedwater heater and drain systems
1.h(1) (c)	-	ECCS demonstration
1.h(1) (d)	-	ECCS interlocks and isolation valves
1.h(4)	-	Containment combustible gas control
1.h(8)	-	Tanks and other sources of water for ECCS
1.h(10)	-	Ultimate heat sink
1.j(1)	-	Pressurizer pressure and level control
1.j(6)	-	Loose parts monitoring
1.j(7)	-	ECCS leak detection systems
1.j(8)	-	Automatic reactor power control system, Tavg control system
1.j(9)	-	Seismic instrumentation
1.j(17)	-	FW heater temperature, level, and bypass control
1.j(20)	-	Flooding detection
1.j(22)	-	PAMS
1.j(25)	-	Process computers
1.k(2)	-	Personnel monitors and radiation survey instruments
1.k(3)	-	HEPA filter and charcoal absorber inplace tests
1.k(5)	-	Isolation of condenser off gas
1.k(0)	-	Isolation of HVAC systems
1.k(7)	-	Isolation of Liquid radwaste effluent
1.n(10)	-	Purification and cleanup of RCS
1.n(14)	-	HVAC systems (specifically Containment Subsystems other than RCFC, Purge, and Isolation Valve Cubical HVAC, Fuel Handling Building HVAC, and Supplementary Fuel Pool Cooling)

Question 423.22 (Continued)

1.n(18) - Heat tracing and freeze protection
1.o(1) - Crane load tests
1.o(2) - Component handling interlocks
1.o(3) - Safety devices on fuel handling equipment

4. Low Power Testing

4.h - Chemical and radiochemical tests to demonstrate chemical control and analysis systems
4.i - Rod withdrawal inhibit and interlock
4.k - Operability of steam driven equipment
4.l - Operability of MSIV's and branch steam line valves at rated temperature and pressure
4.n - Control room computer
4.p - Demonstration of pressurizer and main steam relief valves at rated temperature.
4.t - Performance of natural circulation test

5. Power Ascension Tests

5.l - ECCS demonstration
5.m - RCS demonstration
5.n - Loose parts monitoring baseline data
5.o - RCS leak detection
5.q - Verification of computer inputs and calculations
5.u - MSIV and branch line isolation valves
5.v - Main steam and feedwater verification
5.aa - Chemical and radiochemical control demonstration
5.bb - Neutron and gamma surveys
5.cc - Radwaste demonstrations
5.ii - Reactor Coolant Pump trip tests
5.kk - Loss of feedwater heater tests
5.mm - MSIV closure test
5.nn - Load rejection test
5.oo - Piping movement, vibration, and expansion

Response

The operability of the systems and components will be demonstrated either as a prerequisite to or during the tests as described by the test summaries as noted below.

1. Preoperational Testing

Item No.	Test Summary No.
1.a(2)(a)	43
1.a(2)(b)	Applicable systems, 23 and 24

Response (Cont'd)

1.a(2)(c)	43
1.a(2)(d)	43
1.a(2)(e)	31
1.a(2)(g)	All applicable tests
1.a(2)(h)	43
1.a(2)(i)	43
1.a(3)	43, 46
1.a(4)	23
1.d(1)	31
1.d(2)	31
1.d(3)	31
1.d(4)	31
1.d(9)	Acceptance Test
1.e(1)	43
1.e(5)	Acceptance Test
1.e(10)	Acceptance Test
1.h(1)(c)	25
1.h(1)(d)	25
1.h(4)	47
1.h(8)	Applicable systems tests
1.h(10)	35 Test of Essential Cooling Pond for 30 day requirement is not included.
1.j(1)	43
1.j(6)	Startup Test
1.j(7)	39
1.j(8)	Startup Test
1.j(9)	Acceptance Test
1.j(17)	Acceptance Test
1.j(20)	39
1.j(22)	14, 20
1.j(25)	Acceptance Test
1.K(2)	Acceptance Test
1.K(3)	Applicable HVAC system tests
1.K(5)	Not applicable
1.K(0)	50
1.K(7)	50
1.n(10)	28
1.n(14)	6, 9, 10, 11, 13
1.n(18)	Applicable system tests
1.o(1)	33
1.o(2)	33
1.o(3)	33

4. Low Power Testing

4.h See Section 14.2.12.2 test summaries 22 and 28.

4.i Demonstration of the operability of the control rods will be accomplished during the performance of test 3 in Section 14.2.12.3 and the Acceptance Test of the Control Rods.

Response (Cont'd)

4.k See Section 14.2.12.2 test summary 32 and 43. Main turbine and steam driven feed pumps will be demonstrated to be operable during the power ascension testing. See FSAR Section 14.2.12.3 test summary 20.

4.l See revised Section 14.2.12.2 test summary 31 and 43.

4.n Various systems that will be acceptance tested.

4.p See revised Section 14.2.12.2 test summary 31 and 43.

4.t See revised Section 14.2.12.3 test summary 13.

5. Power Ascension Test

5.l Test to demonstrate design capability of all system and components provided to remove residual or decay heat from the Reactor Coolant System, including Turbine Bypass System, atmospheric steam dump valves, Residual Heat Removal (RHR) System and Auxiliary Feedwater System will be performed during the preoperational hot functional test.

5.m These tests are described in Section 14.2.12.3 test summary 6.

5.n See Section 14.2.12.3 test summary 30.

5.o A leak integrity test will be performed as a standard operating procedure every time the reactor vessel head is installed.

5.q Various systems that will be acceptance tested.

5.u See revised Section 14.2.12.3 test summary 31. This test will be conducted at a power level of 15 to 20 percent rather than 25% to prevent the unnecessary opening of the steam generator code safety valves. The heat from the nuclear steam supply will be released to the atmosphere through the power operated relief valves.

5.v See revised Section 14.2.12.3 test summary 20.

5.aa See revised Section 14.2.12.3 test summary 29.

5.bb See revised Section 14.2.12.3 test summary 14.

5.cc These tests are described in Section 14.2.12.2 test summary 37, 41 and 42.

5.ii This test appears to be a requirement for BWR facilities and does not apply to STP.

5.kk See revised Section 14.2.12.3 test summary 32.

5.mm See revised Section 14.2.12.3 test summary 31. This test will be performed at a power level of 15 to 20 percent rather than 100% to prevent the unnecessary opening of the steam generator code safety valves. The heat from the nuclear steam supply will be released to the atmosphere through the power operated relief valves.

5.nn See revised Section 14.2.12.3 test summary 23.

5.oo These tests are performed earlier in the test program (See Section 14.2.12.2 test summary 44, 45, 46 and need not be repeated.

Question 423.23

We could not conclude from our review of the preoperational test phase description and the test summaries provided in Section 14.2.2.2 that comprehensive testing is scheduled for several systems or components. Therefore, clarify or expand the description of the preoperational test phase to address the following:

(a) 2. Unit Standby Transformers - Expand the test description and acceptance criteria to include testing to ensure that ESF bus voltage will not be degraded if the standby transformers are subjected to the transient produced if, while carrying the full load of one unit, the ESF loads of the second unit are automatically switched to a single standby transformer.

(b) 4. Plant Lighting - Specify that both ac and dc emergency lighting will be tested and verify that dc lighting will be available for a minimum of 4 hours.

(c) 17. 13.8KV Emergency Bus - Modify the test description to specifically describe testing of the undervoltage relays and the breaker interlocks that prevent supplying the transformer from two sources.

(d) 18. Heat Tracing - Modify the test description to identify the systems on which heat tracing will be tested.

(e) 19. Communications - Modify the test description to ensure that all systems assumed to function in the emergency plan (radios, telephone circuits, as well as in-plant systems in high noise areas) can be heard over the maximum operational noise level in the area.

(f) 21. 125V dc Battery Bus and Bus Channels I, II, III, and IV - Expand the test description to confirm that individual cell limits are not exceeded during the design discharge test and specify the minimum acceptable terminal voltage. Demonstrate that dc loads will function as necessary to assure plant safety at a battery terminal voltage equal to the acceptance criteria that have been established for minimum battery terminal voltage for the discharge test. Describe your plans to demonstrate proper calibration and trip settings of protective devices, alarms, and ground detection devices.

(g) 22. 4.16KV Class 1E Switchgear
23. 480V Class 1E Switchgear
24. 480V Class 1E MCC

Question 423.23 (Con't)

Modify these tests as necessary to include verification of under-voltage protection devices and that connected loads will function as necessary to assure plant safety at the minimum bus voltage that can exist prior to bus trip.

(h) 26. 120V ac 1E Bus, Channel I, II, III, and IV - Expand the test description to include operation of connected loads from the alternate 120V single phase regulated supply and testing of the interlocks which prevent connecting the alternate supply while the inverter is powering the bus. Include acceptance criteria to ensure that the 120V ac supply will maintain 60 = 0.5HZ and 115V $\pm$ 2 percent as described in your FSAR.

(i) 28. Containment HVAC Normal and Supplementary Purge Subsystem - Expand the test description to include testing of the isolation features to verify isolation times.

(j) 29. Containment HVAC RCFC System - Describe how testing will verify that the RCFC can maintain temperatures inside containment at x 120°F during normal operation.

(k) 31. Containment HVAC Isolation Valve Cubicle Subsystem - Expand the test description to include testing of the system's ability to maintain temperatures in the AFW pump areas within design limits with design heat loads produced in the areas.

(l) 32. MAB HVAC - Expand the test description to include testing to demonstrate proper operation of lab and sample room exhaust fan bypass and seal line dampers.

(m) 33. EAB HVAC - Ex]and the test description to specifically address control room subsystems, including makeup requirements, pressurization of the air intakes between dampers, makeup ACU's switchover from MAB to EAB chilled water, fire damper operation, pressure controller operation, and isolation on detection of actaldehyde and vinyl acetate. Also describe testing to ensure that, upon failure of the battery rooms' centrifugal exhaust fans, discharge through transfer ductwork will be sufficient to maintain hydrogen concentration below 2 percent.

(n) 34. Diesel-Generator Building HVAC - Expand the test description to include testing of the Fuel Tank Room heating and ventilating system and purge. Also, describe testing of the oil bath inlet filters and operation of the temperature controllers and dampers.

(o) 40. EHC System - Expand acceptance criterion b.2 and method d.1 to identify the valves to be tested and provide assurance that quantitative acceptance criteria will be established. Provide the basis for the quantitative acceptance criteria.

Question 423.23 (Con't)

(p) 41. Containment Hydrogen Monitors - Expand the test description to indicate that the alarm function at 3.5 percent hydrogen concentration will be tested.

(q) 42. Solid-State Protection System (SSPS) - Identify the specific subsystems to be tested and relate them to their specific technical specifications limits. Specify how the response time testing of reactor trip signals will verify time response from when the variable makes a step change from 5 percent below to 5 percent above the trip setting to the point where the rods are free, as described in your FSAR. Modify the acceptance criteria to ensure that the response time of the associated hardware between the measured variable and the input to the sensor (snubbers, sensing lines, flow limiting devices, etc.) for all channels for which response time limits are included in your technical specifications. (The delay times of instrument lines may be accounted for analytically.)

(r) 43. ESFAS Train A, B, and C - Modify the test description to identify the subsystems which will be tested and describe the testing to be performed to verify system response times. Describe the testing to be performed to verify system response times. Describe testing of the ESFAS inputs from the Solid State Logic Protection System and testing of ESFAS test cabinet. In method step d.2, identify the "required conditions" to be simulated.

(s) 44. RCPB Leakage Detection System - Modify the acceptance criteria to correspond to the test method in Section d. Describe the testing that will confirm the ability to detect intersystem leakage into systems that interface with the RCS.

(t) 48. Boron Concentration Measurement System - Verify that actual reactor coolant will be sampled by the system and the indicated concentration compared with samples analyzed in the laboratory.

(u) 50. Process and Area Radiation Monitoring System - Specify whether the isolation features of the RCB stack, GWPS discharge, spent fuel pool ventilation exhaust, Boron Recycle System distillate, LWPS discharge, CCW system, and turbine generator building drain monitors, as described in Section 11.5 of your FSAR, will be tested in this test or in the individual test descriptions for these systems. Modify the appropriate test descriptions as necessary. Describe testing to ensure that sample paths and flow rates to detectors, as appropriate, are in accordance with design requirements.

(v) 51. Fire Protection Systems (Water Subsystem) - Ensure that testing will be done to verify that the diesel driven pumps will start from cold conditions.

Question 423.23 (Con't)

(w) 62. Primary Sampling System - Expand the test description to include verification that sample accuracies are sufficient to verify technical specification requirements. Describe the testing to verify that sample line isolation valves function as assumed in the accident analysis.

(x) 65. Main Feedwater System - Modify the acceptance criteria to ensure that feedwater isolation valves close in less than 5 sec. and that instrument time delays are less that 1.5 sec. as assumed in the FSAR.

(y) 68. Circulating Water System - Modify the test description to include testing of the traveling screens and screen wash system.

(z) 71. Instrument Air System - In accordance with question 423.17b., modify the test description to conform to Regulatory Guide 1.80. Provide a description of testing to be conducted on the Station Air system to ensure that it can supply a sufficient quantity of clean, dry air to the instrument air system, if required. Include testing of the automatic controls that link the systems on low pressure in the instrument air header.

(aa) 72. Chemical Feed System - Identify the systems and chemicals included in this test.

(bb) 73. RCS Hydrostatic Test - Rename the test to indicate that it is a cold, integrated system test, not a hydrostatic test. Expand the test to include integrated testing of auxiliary systems as per Regulatory Guide 1.68, Appendix A, Section 1.a(1).

(cc) 75. Pressurizer Relief Tank - Describe the testing to be conducted to verify operation of the internal spray and to verify tank temperature and pressure following a design blowdown (110 percent of pressurizer steam space volume).

(dd) 78. RHR System - Expand the test method and acceptance criteria to identify the design point at which pump performance is determined, to specifically describe testing of isolation interlocks and controls which prevent system overpressurization, and to verify operation to transfer water from the RWST to the refueling cavity.

(ff) 79. Containment Spray System - Describe the testing planned to verify the system response time from spray initiation on Hi_2 or Hi_3 containment pressure and spray flow transit time. Identify the design point at which pump operation will be verified. Ensure that the point at which air will be introduced in the spray nozzle test is upstream of the valves used to isolate the nozzles from pump discharge flow when verifying system flow to the RWST (i.e., the test boundaries should overlap).

Question 423.23 (Con't)

(gg) 80. CVCS - Expand the acceptance criteria to more specifically relate to the test method. Identify the design point at which charging pump performance will be verified. Describe testing of pump mini-flow recirc and recirc isolation, auxiliary spray flow, adjustment of pump-seal flow, diversion of letdown or pump suction on VCT levels, operation in automatic, dilution, alternate dilution, boration, and manual modes, and the interlock to prevent injection while in manual mode.

(hh) 81. Standby Diesel Generator - Modify the test description in accordance with question 423.17c.

(jj) 85. Auxiliary Feedwater System - Expand the test to include verification that maximum and minimum flows are within the design range and that response time for flow initiation is less than assumed. Include testing that will ensure that the AFW pumps will perform satisfactorily when run for extended periods of time on the recirculation lines (i.e., do not overheat, cavitate, etc.).

(kk) 86. Fuel Handling Equipment - Identify the cranes, hoists, and equipment that will be included in the test.

(ll) 87. Spent Fuel Pool Cooling System - Expand the test description to include testing of the skimmer loop, antisiphon holes, and liner leak detection and alarm.

(mm) 88. Essential Cooling Water System - Expand the test description to include testing of the compartment watertight doors and the interlocks that prevent opening more than one door. Include testing of the pump auto starts on diesel generator and CCW initiation. Identify the pump design point.

(nn) 89. Component Cooling Water - Expand the test description to include testing of the auto-isolation of non-ESF loads on SIS, the automatic isolation of the surge tank vent on high radiation, and verification of water chemistry. Identify the pump design point.

(oo) 93. Containment Integrated Leak Rate Test - Expand the test description to include Type A, B, and C testing in accordance with Appendix J to 10 CFR Part 50 or reference appropriate sections of your FSAR. Include the test method, duration of stabilization and test periods, method of isolation valve closure, and test of personnel and equipment air locks.

(pp) 94. Radioactive Equipment and Floor Drain Sump System - Expand the test description to include the 10 ft. of water or 5 psig air test described in the FSAR.

Question 423.23 (Con't)

(qq) 95. Solid Radioactive Waste - Expand the test program to include testing of cement metering, chemical neutralizer operations, and sonic probes and level switches on mixing tank and containers. Include testing to ensure that free liquid is not present following solidification.

(rr) 98. RCS Hot Functional Test - Several test descriptions (AFW, Main Steam, ECCS, etc.) contain notes on tests to be conducted during hot functional testing. Either expand the individual test descriptions or the hot functional test description to provide test methods, test objectives, and acceptance criteria for these tests. Ensure that testing will demonstrate heat exchanger and cooling water systems performance at design load or at conditions that can be extrapolated to design conditions.

Response

The rewrite of FSAR Chapter 14.2 Section 14.2.1.1 states that the initial test program will be divided into three categories: Prerequisite Testing, Preoperational/Acceptance Testing and Initial Startup Testing. The definition given states that preoperational tests will be conducted on safety related systems and acceptance tests on non-safety related systems.

The preoperational test summaries in Section 14.2.12.2 are written for safety-related systems. A list is also provided of those non-safety related systems identified in Reg. Guide 1.68 Appendix A that will be acceptance tested.

The test summaries are brief and do not contain the details of the test. The details will be contained in the preoperational test procedures. These procedures, as stated in Section 14.2.3 will be review by the responsible design organization, through the Joint Test Group (JTG), and submitted to the Startup Manager for approval.

Question 423.24

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

Response

The detailed test procedures will contain those items that are required to adequately identify and evaluate the performance of each system test. These will be verified in accordance with administrative procedures.

Question 423.25

Our review of recent licensee event reports disclosed that a significant number of reported events concerned the operability of hydraulic and mechanical snubbers. Provide a description of the inspections or tests that will be performed following system operation to assure yourself that the snubbers are operable. These inspections or tests should be performed preoperationally if system operation can be accomplished prior to generation of nuclear heat.

Response

Following preoperational testing and prior to initial criticality, safety-related and designated high-energy snubbers will be inspected in accordance with the manufacturer's recommendations to assure that there are no visible signs of damage to the snubbers or loosening of secured attachments as a result of system operation.

Question 423.26

Provide test descriptions or modify existing test descriptions to assure that tests will be performed to demonstrate (1) that the plant's ventilation systems are adequate to maintain all ESF equipment within its design temperature range during normal operations and (2) that the emergency ventilation systems are capable of maintaining all ESF equipment within its design temperature range with the equipment operating in a manner that will produce the maximum heat load in the compartment. If it is not possible to operate equipment to produce maximum heat loads, describe how the tests performed satisfy the objectives listed above. Also include testing in accordance with Regulatory Guide 1.52 or 1.140, as applicable.

Response

1. To the extent practical, it is intended that HVAC systems will be operated during hot functional testing. Doing this will produce the maximum heat load attainable to verify design requirements. In those cases where certain equipment cannot be subjected to an adequate heat load, data will be collected to confirm design calculations.

2. Emergency ventilation systems testing has been included as part of the integrated testing during diesel generator testing.

Question 423.27

1. Provide descriptions of the electrical lineups of both units during preoperational testing of Unit 1 in accordance with Regulatory Guide 1.41. Include an evaluation of how this lineup precludes inadvertently powering Unit 1 buses from Unit 2 sources. Address both normal and emergency power distribution systems.

2. Provide descriptions of the electrical lineups of both units during preoperational testing of Unit 2 in accordance with Regulatory Guide 1.41 subsequent to initial criticality of Unit 1. Provide assurance that crossties between the units that could result in loss of power to any Unit 1 emergency bus due to testing of Unit 2 do not exist. Address both normal and emergency power distribution systems.

3. Provide a test description for integrated electrical system testing to accomplish these objectives.

Response

1. During preoperational testing on Unit 1, the Unit 2 standby transformer will not be available as a power source. Therefore, inadvertent powering of Unit 1 buses from Unit 2 sources in not possible. The Unit 2 standby transformer will, however, be required for Unit 1 core loading and for subsequent power testing and operation.

2. During Unit 2 testing, with Unit 1 in operation, the automatic transfer feature (Unit 1 standby transformer supplying power to a "low voltage" on Unit 2) will be defeated, so that no transfer can be made from Unit 2 loads to the Unit 1 standby transformer.

3. Testing of the automatic transfer feature will be completed with Unit 1 shutdown. It is included in Section 14.2.12.2.

Question 423.28

Modify the test descriptions for all systems that penetrate containment and will be operated in post-accident conditions, to ensure that leak rates are in accordance with design and release limits.

Response

This testing will be part of that included in revised test description 38.

Question 423.29

Describe the testing to be conducted to verify that the capacity of pressurizer and steam generator power-operated reliefs and steam dump and turbine bypass valves are within the minimum and maximum values assumed in the accident analysis.

Response

Testing of each pressurizer and steam generator power-operated relief valve and each steam dump and turbine bypass valve, to demonstrate that the capacity of each valve is within the minimum and maximum values assumed in the accident analysis, is neither practical nor justified for the following reasons.

1. There is no practical method of measuring steam flowrate from any of these valves after they are installed.

2. Assuming that a method of measuring flowrate could be developed, testing of each valve would put the unit through numerous undesirable transients, because there are 2 pressurizer power-operated relief valves, 4 steam generator power-operated relief valves, 20 steam safety valves, and 12 condenser steam dump valves. A relatively lengthy blowdown period would be required for each test in order to measure either (a) steam flowrate or (b) cooldown rate, which could be extrapolated to flowrate. Imposing a modified Condition II event on the unit is not justified.

3. Testing of the unit's full load rejection capability adequately demonstrates that the capacities of the power-operated relief valves and steam dump valves are consistent with design.

4. The safety valves are ASME Section III components and as such have been tested by the manufacturer in accordance with the code requirements. The other relief/dump valve capacities have been verified by the respective manufacturers to be in accordance with design flowrates. These verifications are based on standard industry practices, which include obtaining flow characteristics by testing and/or calculating flow capacities based on specified conditions. The present test program verifies the valve stroke length to be in accordance with the manufacturer's specifications for each valve, thus ensuring that the specified valve opening is not exceeded.

Question 423.30

Identify any of the initial startup tests described in Section 14.2.12.3 that are not essential towards the demonstration of conformance with design requirements for structures, systems, components, and design features that:

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

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

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

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

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

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

Response

Review of the initial startup tests described in Section 14.2.12.3 verifies that all tests are essential for the demonstration of conformance with design requirements for structures, systems, components, and design features stated above.

Question 423.31

Your response to question 423.5 is inadequate. If any test summarized in Section 14.2.12.2 of your FSAR will not be completed prior to fuel loading, identify it and provide the information requested in 423.5.

Response

See revised Section 14.2.5.2.

Question 423.32

Section 14.2.5 identifies the plateaus for the power ascension testing. Indicate either in each test summary or elsewhere in Section 14.2 (a table or figure) which tests will be conducted at each plateau. Test power levels should be consistent with Regulatory Guide 1.68, Rev. 2, Appendix A. Also, indicate in Section 14.2.5 that test results for each test conducted at a given plateau will be evaluated prior to proceeding to the next level.

Response

The description of the initial startup test program should be referred to for the specific plateaus of the test program. Section 14.2.4.1 and Section 14.2.5.3 are specific in the approval to proceed to the next test plateau.

Question 423.33

We could not conclude from our review of the startup test summaries in Table 14.2-3 that all of the tests will be comprehensive. Therefore, clarify or expand the summaries to address the following:

(a) 1. Moveable Incore Detector - Describe testing which will verify detector response to actual flux.

(b) 2. Rod Position Indicators - Expand the test description to include testing of the bank insertion monitor, deviation alarms, and rod bottom bistable setpoints and alarms.

(c) 3. Rod Control System - Identify the "various modes" to be tested.

(d) 5. Rod Drop Time Measurement - Describe additional testing that will be conducted for the rods falling ou e the two-sigma limit at each test condition. Also describe the te s planned to demonstrate proper operation of the decelerating devices.

(e) 6. RCS Flow Test - Describe your plans for vibration monitoring and operation of pump anti-reverse rotation devices.

(f) 8. RTD Bypass Flow Verification - Modify the test description to include the RTD accuracy comparisons described in Section 7.3 of your FSAR.

(g) 9. Reactor Trip Circuit - Expand the test description to include testing to ensure that control rod drive latching mechanisms will unlatch upon opening of the trip breakers; that simulated trip signals will open the trip breakers; that, if the associated trip breaker bypass is shut, opening of the trip breaker does not cause a reactor trip; and that interlocks to prevent closing of both reactor trip bypass breakers simultaneously function properly. Also describe testing you have planned to demonstrate operation of rod motion blocks and turbine runbacks.

(h) 12. Zero-Power Physics Tests - Revise acceptance criterion 3, differential boron worth, to relate to values assumed in the FSAR such as maximum CVCS reactivity insertion rates. State how you will determine the most reactive RCCA.

(i) 14. Nuclear Instruments - Expand the test to include determination that excore instrumentation can detect axial flux differences and fuel pin and core barrel movement as assumed in the FSAR.

Question 423.33 (Con't)

(j) 15. Effluent Radiation Monitors - Modify the test description to include demonstration of proper operation of effluent, process, and area radiation monitors under operating conditions. Provide acceptance criteria for verification by performing independent laboratory or other analyses.

(k) 19. Plant Response to Load Changes - Modify the acceptance criteria to specifically relate to each test to identify the specific control actions expected to occur or not to occur. Specify the modes that major control systems will be tested in. Expand the acceptance criteria to address acceptable overshoot, undershoot, or oscillation.

(l) 20. Rod Control System At-Power - Modify the acceptance criteria to identify unacceptable "overshoot."

(m) 22. Turbine Trip - Expand the test summary to identify the parameters to be recorded and control functions which will be observed. The acceptance criteria should be expanded to ensure that the recorded parameters and observed transient results will be compared with predicted results for the actual test case, and quantitative values should be provided for the required convergence of actual test results with predicted values. The basis for these criteria should be provided.

(n) 23. Loss of Offsite Power - The test should demonstrate for approximately 30 minutes that the necessary equipment, controls, and indications are available following the station blackout to remove decay heat from the core using only emergency power supplies. Verify that opening the switchyard circuit breakers results in the maximum credible turbine overspeed condition.

(o) 24. Shutdown from Outside the Control Room - Expand the test description to more completely discuss compliance with Regulatory Guide 1.68.2. Include communication with and responsibility of control room observer, control of transferred components, number of persons conducting the test, duration of test, and cold shutdown demonstration. Update your commitment in Section 3.12 to indicated compliance with Revision 1 to Regulatory Guide 1.28.2 (July 1978) which is applicable to your plant.

(p) 26. Static RCCA Drop and RCCA Below-Bank Position Measurements - Modify acceptance criteria 2 to indicate that excore or incore instrumentation will detect a misaligned RCCA when the misalignment is outside the technical specification limits. Modify acceptance criterion 4 to conform to technical specification 3/4.2.4. Indicate in the test method that a high worth RCCA will be inserted. Expand the test method and acceptance criteria to include returning the rod to its proper bank position.

Questions 423.33 (Con't)

(q) 27. Pseudo Rod Ejection Test - Modify acceptance criterion 2 to indicate that excore or incore instrumentation will detect a misaligned RCCA when the misalignment is outside the technical specification limits.

Response

(a) See revised Section 14.2.12.3, test description 1.

(b) See revised Section 14.2.12.3, test description 2. Testing of the bank insertion monitor will be accomplished using simulated signals during component testing of the process control loops.

(c) See revised Section 14.2.12.3, test description 3.

(d) See revised Section 14.2.12.3, test description 5.

(e) The vibration monitoring and operation of pump anti-reverse rotation devices will be verified during the hot functional test program and are included in preoperational test description 43.

(f) The RTD accuracy comparisons are made during the preoperational test program in preoperational test description 19.

(g) See preoperational test descriptions 15, 43 ad 49.

(h) See revised Section 14.2.12.3, test description 12.

(i) See revised Section 14.2.12.3, test description 15.

(j) See revised Section 14.2.12.3, test description 16.

(k) See revised Section 14.2.12.3, test description 20.

(l) See revised Section 14.2.12.3, test description 21.

(m) The Turbine Trip Test has been renamed the "Full Load Rejection Test" to include the requirements of Sections 5.11 and 5.nn of Appendix A to Regulatory Guide 1.68 (Rev. 2). See revised Section 14.2.12.3.23. The test summary has been expanded to identify parameters to be observed and recorded. The acceptance criteria have been expanded to ensure that the recorded parameters and observed transients will be compared with predicted results for the actual test case. The basis for the criteria will be provided in the detailed test procedure.

(n) See revised Section 14.2.12.3, test description 24. The turbine generator will be subjected to the maximum credible overspeed condition in the conduct of the full load rejection test described in Section 14.2.12.3, test description 23.

Response (Con't)

(o) See revised Section 14.2.12.3, test description 25. The cold shutdown demonstration will be conducted during hot functional testing and has been included in preoperational test description 43. The communications with and responsibilities of control room observers, control of transferred components, and number of persons conducting the test will be included in the detailed test procedure. See revised Section 3.12.

(p) See revised Section 14.2.12.3, test description 27.

(q) See revised Section 14.2.12.3, test description 28.

Question 423.34

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

Response

As described in Section 4.3.1.7 of the FSAR, the effects of anticipated transient without scram (ATWS) are not considered in the design bases of the South Texas Project. Therefore, a commitment to test any design features to prevent or mitigate ATWS cannot be made.

Question 423.35

Provide assurance that acceptance criteria will be established for startup tests based on realistic analysis of transients rather than accident analysis assumptions and that test results will be compared with the results of these analyses.

Response

See revised Section 14.2.5.3.