GULF STATES UTILITIES COMPANY

RIVER BEND STATION POST OFFICE BOX 220 ST FRANCISVILLE, LOUISIANA 70775

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June 26, 1985
RBG- 21,412
File Nos. G9.5

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Denton:

River Bend Station - Unit 1
Docket No. 50-458

Enclosed for your review is a Gulf States Utilities Company (GSU) revision to various sections of Chapter 14.2 - Initial Test Program - of the River Bend Station (RBS) Final Safety Analysis Report (FSAR). The attachment to this letter provides clarification and/or justification for each revision. Those revisions contained in the enclosure will be incorporated into a future FSAR Amendment.

Sincerely,

J. E. Booker

J. E. Booker
Manager-Engineering,
Nuclear Fuels & Licensing
River Bend Nuclear Group

erg SRR
JEB/ERG/JWL/amg

Attachment

Enclosure

B001
/40

Attachment

Clarifications and/or Justification

Page(s)	Details
3,4,5,6,7, 11,15,17 Figures 1,2	Organizational changes
40a,59,71,73,75, 90,91,92,115,119	Revisions necessary to reflect current RBS design and testing philosophy
124,124a	Final baseline data (background noise) has to be taken at 90-100% power to ensure a maximum noise level. The noise level is needed to establish the alert level (high alarm) for each sensor. The preoperational test will perform a functional test of the system and set an initial alert level for each sensor.
130	Change the wording from "shutdown margins are performed periodically" to "shutdown margin is demonstrated after 144 bundles have been loaded." This is in accordance with the RBS Startup Databook and the testing done at other sites.
133,133a	(1) Change the requirements for rated pressure friction testing from 50% of the rods to four rods. This change is based on the FRC evaluation to reduce the safety hazard associated with connecting/disconnecting hoses to a 1000 psi potentially radioactive fluid system.
	(2) Change wording on the second note since Test Number 27 may not be done at TC 3. Also replace "before or during" with "for" to include provisions for scram times before, during, or after the test.
136	Change "rated power" to "rated pressure" since this test is only performed during Open Vessel and Heatup Testing.
160	Change the measurement of response rate from linear measurement between 10 and 90% to maximum slope to conform to a change in the test criteria for the Startup Test Specification.
168	Delete the intermediate power turbine trip. Regulatory Guide 1.68 requires only a generator load rejection at full power which is done in the test described in Section 14.2.12.3.24. Turbine trip

	function is verified during TC-1 with bypass capability.
176	Change wording from doing pump trips to a single pump trip at 75% power based on previous BWR 6 performance.
185,186	Delete suppression pool cooling mode per the change to the GE Startup Test Specification. Add note that suppression pool cooling mode is tested in the preoperational test described in Section 14.2.12.1.5.
Figure 14.2-5	Make appropriate changes to agree with test program including the above changes.
135,138,139,141 146,147,156,159 163,164,164b,165 171,177,181,184	Add "appropriate" to the requirement that the preoperational test be completed prior to performing the test since only specific preoperational tests are required to be verified for each ST.
3.9B-28	Delete references to visual and hand held measurements since all testing was done remotely. Also revise the recirculation flow condition. All changes are in accordance with the GE NSSS Preoperational and Startup Pipe Motion Testing Specification.

plant can be safely brought to rated power and sustain power operation.

14.2.2 Organization and Staffing

The River Bend Station startup organization is shown in Fig. 14.2-1 and is as discussed in the the following sections.

14.2.2.1 GSU Startup and Test Department

The GSU Startup and Test Department has overall responsibility for control and conduct of the test program during the preliminary, preoperational, and initial startup phases. The Startup and Test Department's efforts are directed by the Superintendent-Startup and Test, who reports directly to the Project Manager. The SWEC Preliminary Test Organization (PTO) has been delegated to perform the 13
majority of preliminary testing. The PTO's efforts are directed by the SWEC Project Manager-Preliminary Test, who reports directly to the SWEC Project Manager. The GE Site Operations Manager, as Senior Startup Representative for GE onsite, serves on the Superintendent-Startup and Test staff to provide NSSS vendor advice and technical direction. The GSU Startup and Test Department and the SWEC Preliminary Test Organization conduct the test program in conformance with the River Bend Startup Manual and related documents associated with accomplishing the test program objectives.

The Startup and Test Department is divided into two internal groups: the Preoperational Test Group responsible for all matters relating to preliminary, preoperational, and acceptance testing, and the Startup Test Group responsible for all matters relating to initial startup testing. Both groups consist of personnel drawn from various organizations such as GSU, the River Bend Station staff, SWEC, GE, and outside consultants.

The Preoperational Test Group consists of three
INSERT Preoperational Test Supervisors (NSSS, BOP, electrical) ~~each~~ ~~of whom~~ reports directly to the Superintendent-Startup and Test. Preoperational Test Engineers are assigned to this group and report directly to one of the supervisors. The 13
Startup Test Group consists of a Startup Supervisor who reports directly to the Superintendent-Startup and Test and four Shift Test Directors, each of whom reports directly to the Startup Supervisor. Startup Test Engineers are assigned to this group and report to the Shift Test Directors. The Shift Test Directors and their assigned Startup Test Engineers comprise the shift complements necessary during

INSERT FOR PAGE 14.2-3

AND A GSU PGCC SUPERVISOR ALL REPORTING TO THE ASSISTANT SUPERINTENDENT - STARTUP & TEST. WHO

14.2.2.1.1 Superintendent Startup and Test

13 The Superintendent Startup and Test has been delegated by the Senior Vice President-River Bend Nuclear Group the responsibility and authority for the management, preparation, and administration of the River Bend Startup Program, including preliminary, preoperational, and initial startup testing.

His direct responsibilities are:

1. Review and approve:

   a. All staffing within the startup and test department

   b. All procedures associated with the preliminary, preoperational, and initial startup test phases of the test program

2. Manage all contracts associated with the test program

3. Act as chairman of the joint test group (JTG)

11 13 4. Report test program status and problems to the ~~Project~~ PLANT Manager

5. Act as liaison with the River Bend Station staff and other GSU departments

6. Coordinate with station department heads in job assignments of plant staff to accomplish the test program objectives

7. Act as startup and test department representative on the FRC

8. Ensure startup and test department conformance to the GSU quality assurance plan

13 9. Supervise the Preoperational Test Supervisors and Startup Supervisor

10. Coordinate vendor participation in the test program.

INSERT

13

INSERT FOR PAGE 14.2-4

14.2.2.1.2 Assistant Superintendent Startup and Test.

1. Review and approve preliminary and preoperational phase test procedures.

2. Act as alternate chairman of the Joint Test Group (JTG).

3. Report test program status and problems to the Superintendent Startup and Test.

4. Act as liaison with the River Bend Station staff and other GSU departments.

5. Coordinate plant staff job assignments with other department heads to accomplish the test program objectives.

6. Supervise the Preoperational Test Supervisors.

7. Review and approve preoperational phase test results.

8. Assume the responsibilities of the Superintendent Startup and Test in his absence.

13

14.2.2.1.3 Preoperational Test Supervisors 13

The direct responsibilities of the three Preoperational Test Supervisors are: 13

1. Test and place into service all equipment and related items in their respective areas of responsibility.

2. Supervise the Preoperational Test Engineers assigned to them. 13

3. Assist in the preparation and approval of preliminary, preoperational, and acceptance test procedures.

4. Coordinate with planning/scheduling a detailed schedule for preliminary, preoperational, and acceptance test activities in their respective areas of responsibility and monitor progress.

5. Review, analyze, and evaluate test results.

6. Act as an alternate chairman of the JTG.

7. Serve as a permanent member of the JTG.

14.2.2.1.4 Preoperational Test Engineers 13

Preoperational Test Engineers assigned to the preoperational test group report to an assigned Preoperational Test Supervisor. Preoperational Test Engineers are assigned specific systems or areas of responsibility for which they, as applicable:

1. Determine the nature and degree of testing required

2. Develop testing activity milestones, target dates, and manpower requirements

3. Follow construction progress to support the startup test program requirements

4. Prepare and ensure that the required detailed preliminary, preoperational, and acceptance test procedures are available for review and approval

5. Identify special or temporary equipment or services needed to support testing

6. Assure that testing identification tagging and station tagging are implemented as necessary to support testing and turnover

7. Direct all participating groups during the preparation for and execution of assigned tests

8. Expedite testing progress as necessary to support the project schedule

9. Identify and assist in the resolution of deficiencies and problems found during the construction and testing of assigned systems and areas

10. Review and evaluate test results and prepare test summaries.

13 | 14.2.2.1.~~4~~ 5 Startup Supervisor

13 | The direct responsibilities of the Startup Supervisor are:

1. Coordinate and schedule all initial startup test activities.

13 | 2. Supervise the Shift Test Directors.

3. Assist in the preparation, review, and approval of all initial startup test procedures.

4. Review, analyze, and evaluate initial startup test results.

5. Assist in the resolution of deficiencies encountered during initial startup testing.

13 | 14.2.2.1.~~5~~ 6 Startup Test Group Shift Test Directors

13 | The Startup Test Group Shift Test Directors are the senior startup and test department personnel on shift during the initial startup test phase of the test program. The direct

responsibilities of the four Shift Test Directors are:

1. Coordinate and direct testing via the shift supervisor for the conduct of all initial startup testing scheduled for their shift

2. Supervision of assigned Startup Test Engineers 13

3. Assist in the preparation and approval of initial startup test procedures

4. Review, analyze, and evaluate test results and data

5. Coordinate with planning/scheduling for initial startup activities

6. Expedite testing progress as necessary to support the project schedule.

14.2.2.1.7 Startup Test Engineers 13

Startup Test Engineers assigned to the startup test group report to an assigned Shift Test Director. The direct responsibilities of Startup Test Engineers are:

1. Prepare and ensure that the detailed required initial startup test procedures are available for review and approval

2. Identify special or temporary equipment or services needed to support initial startup testing

3. Direct all participating groups during the preparation for and execution of assigned tests

4. Identify and assist in the resolution of deficiencies and problems found during initial startup testing

5. Review, analyze, and evaluate test results and data.

INSERT

14.2.2.2 River Bend Station Staff

The River Bend Station staff consists of those GSU employees who staff, maintain, and operate River Bend Station. Chapter 13 details their duties and general responsibilities. The station staff, while supporting the test program and maintaining all structures, systems, and components following turnover to GSU, will be under the technical direction of the GSU Startup and Test Superintendent. 13

INSERT FOR PAGE 14.2-7

14.2.2.1.8 SUPERVISOR - STARTUP AND TEST, CONTROLS

The direct responsibilities of the Startup and Test Controls Supervisor are:

1. Develop and manage the administration of the startup and test program.

2. Prepare and administer a training program for the qualification of startup and test engineers.

3. Supervise documentation control of startup records to assure completeness and retrievability.

4. Technical reviews of preoperational and startup test procedures and test results and Station Operating Manual procedures.

14.2.2.7 Facility Review Committee

DELETE AND REPLACE WITH INSERT

~~Commencing with initial fuel load, the facility review committee (FRC) supplants the JTG as the primary review and approval organization of the test program. The organizational structure, functions, and responsibilities of FRC are described in Chapter 13. During the initial start test phase, the FRC is augmented by the Superintendent Startup and Test and the GE Operations Manager.~~ 9

14.2.2.8 Qualification

The staffing and qualifications of the River Bend Station staff are detailed in Chapter 13. Engineers involved in Startup and Test testing activities are qualified in accordance with ANSI/ANS 3.1-1981, Selection and Training of Nuclear Power Plant Personnel, as delineated below. The minimum qualifications of engineers responsible for developing preoperational test procedures, performing preoperational tests, and generating preoperational test reports are as follows: 13

1. The individual possesses a Bachelor's degree in engineering or related sciences

2. The individual has 1 yr of related power plant experience. 15

The minimum qualifications of engineers responsible for developing startup test procedures, performing startup tests, and generating startup test reports are as follows:

1. The individual possesses a Bachelor's degree in engineering or related sciences

2. The individual has 2 yrs of related power plant experience of which 1 yr is nuclear power plant experience. 15

In addition to the individual responsible for developing the test procedure and performing the test, preoperational and initial startup test procedures and test results are reviewed and approved by individuals having the following minimum qualifications. One individual may fulfill more than one of the categories listed below.

1. One individual meets the following requirements:

   a. He possesses a Bachelor's degree in engineering or related sciences

INSERT FOR PAGE 14.2-11

COMMENCING WITH INITIAL FUEL LOAD, THE FACILITY REVIEW COMMITTEE (FRC) ASSUMES THE RESPONSIBILITY FOR REVIEW OF TEST RESULTS PRIOR TO RECOMMENDING ACCEPTANCE TO THE PLANT MANAGER. DURING THE INITIAL STARTUP TEST PHASE, THE FRC IS AUGMENTED BY THE SUPERINTENDENT - STARTUP AND TEST AND THE GE OPERATIONS MANAGER. TO AID THE FRC IN THE REVIEW OF PREOPERATIONAL TEST DATA FOR PREOPERATIONAL TESTS CONDUCTED AFTER FUEL LOAD, THE JTG REVIEWS THE DATA AS A SUBCOMMITTEE OF THE FRC. TEST DATA SUMMARY REPORTS ARE PROVIDED TO THE FRC FOR REVIEW AND CONCURRENCE PRIOR TO ACCEPTANCE.

8.0 SYSTEM RESTORATION
9.0 DATA REQUIREMENTS
10.0 ACCEPTANCE CRITERIA
<u>MINOR MODIFICATION PAGE</u>
<u>TEST DEFICIENCY PAGE</u>
<u>ENCLOSURES</u>
<u>ATTACHMENTS</u>

Preoperational test procedures are developed by the responsible preoperational test engineers. Each test procedure is prepared using pertinent reference material
5 such as design and test specifications from GE, design documents from SWEC, safety analysis report, technical specifications, and applicable regulatory guides.

Upon completion of the initial procedure draft, the preparer
13 forwards it to the cognizant Preoperational Test Supervisor, who reviews and comments on it. Following the resolution of
13 comments with the preparer, an acceptable procedure draft is submitted to the following people for review: Superintendent Startup and Test, GE Operations Manager, SWEC
STAFF REPRESENTATIVE Site Advisory Manager, Plant ~~Manager,~~ and Supervisor of Operational Quality Assurance. The preparer resolves all comments generated by the reviewers and issues a revised procedure draft to the same people for a second review. Following the resolution of any additional comments by the author and the lead engineer, the procedure is submitted to the JTG for final review, approval, and distribution.

14.2.3.2 Initial Startup Test Procedures

The River Bend Station Startup Manual establishes the method for preparing, reviewing, approving, revising, and controlling all initial startup test procedures. The Startup Manual specifies procedure content, format, and
13 style guidelines. An example of the format for initial startup test procedures is given below:

<u>TITLE PAGE</u>
<u>LIST OF EFFECTIVE PAGES</u>
<u>SIGNATURE RECORD PAGE</u>
<u>(LATERS) PAGE</u>
<u>TABLE OF CONTENTS</u>
<u>MAIN BODY SECTIONS</u>
1.0 GENERAL DESCRIPTION
2.0 REFERENCES
3.0 ACCEPTANCE CRITERIA
4.0 GENERAL REQUIREMENTS
5.0 TEST PERFORMANCE
13 6.0 SPECIAL TEST PROCEDURES
7.0 ENCLOSURES
8.0 TEST PACKAGES

performance. It is the responsibility of shift test directors and startup test engineers to ensure that all prerequisites are satisfied prior to performance of any initial startup test.

14.2.4.3 GSU Work Request

The GSU work request is used to initiate maintenance or to implement modifications on systems that are under the jurisdictional control of GSU. The GSU work request assigns responsibility for performing the work, gives authorization for the work to be performed, and identifies retest requirements. Results of retests due to maintenance and/or modifications are reviewed and approved by the same organization that originated the work request. Results of the retests due to modifications are reviewed and approved by the same organization that reviewed and approved the original test results.

14.2.5 Review, Evaluation, and Approval of Test Results

Upon completion of a test, the test engineer reviews the test data for completeness and evaluates the results to ensure they meet all acceptance criteria or notes allowable exceptions. Preoperational test results are reviewed and approved by the JTG. Initial startup test results are reviewed and approved by the augmented FRC. Review and approval of test results is kept current with testing requirements so succeeding tests are not dependent on an untested structure, system, or component. 5

Prior to initial fuel load and commencement of initial startup testing, a comprehensive review of the preoperational test phase is conducted by the JTG and FRC to provide assurance that plant systems and structures are capable of supporting the initial fuel load and subsequent operational testing. Structures, systems, and components not tested prior to fuel load will be identified. Proper notification and justification will be provided and the appropriate tests rescheduled for after fuel loading. ~~The JTG and FRC are required to approve or disapprove the preoperational test results and the resolution of test exceptions.~~

Each area of startup testing (fuel load, open vessel testing, heatup, power ascension) is a prerequisite in itself which is completely reviewed and evaluated by the augmented FRC prior to starting tests in the succeeding area. The test results of each power ascension testing

d. Containment isolation valves for the following system are available: ~~and Type C leak rate testing is completed on them.~~

(14) Fuel pool cooling and cleanup

(15) Component cooling water

(16) Reactor plant component cooling water

(17) Liquid radwaste effluent

(18) Cooling tower blowdown

(19) Standby gas treatment

2. Prerequisites

a. Required preliminary tests are completed and approved. 13

b. Instrument calibration is complete.

c. Electrical power is available.

d. Field acceptance test is complete.

d ~~e~~. Check sources are in place where required. 5

e ~~f~~. Trip points are set.

3. Test Procedure

a. Verify area and process radiation monitor channel connection, recording, alarm, isolation, and interlock functions.

b. Check all area and process radiation channels with a radioactive source.

c. Demonstrate proper operation of all process sample racks.

4. Acceptance Criteria

a. System logic functions, including permissive and prohibit interlocks, system initiations and isolations, and alarms, function as specified by the system elementary diagrams.

b. Sample racks operate as specified by the manufacturer's technical instruction manual.

3. Test Procedure 15

   a. Verify all fan, filter, heater, damper, and air conditioner interlocks, trips, permissives and controls function correctly. 15

   b. Verify operating times for isolation dampers are acceptable.

   c. Verify correct system response to manual and automatic isolation signals, including actions 5 caused by smoke, and radiation detectors.

4. Acceptance Criteria 15

   a. All fan, heater, damper, and air conditioner interlocks, trips, permissives, and controls function as specified by the system elementary diagrams.

   b. Damper operating times are specified by the S&W Technical Data Sheets for Air Dampers. 5

   c. System operating response for manual and automatic signals is as specified by FSAR Chapter 9, Section 9.4.1 and the system elementary diagrams.

3. Test Procedure

   a. Measure chilled water pump and condenser water pump performance.

   b. Check trips, permissives, interlocks, controls, alarms, and computer points.

   c. Check chiller performance.

   d. Check control valve operation.

4. Acceptance Criteria

   a. Chilled water and condenser water pumps perform as specified by FSAR Chapter 9, Table 9.2-19.

   b. Trips, permissives, interlocks, controls, and alarms function as specified by the system elementary diagrams. 5

   c. The chiller performance is comparable to the manufacturer's technical instruction manual.

   d. Control valves control flow and temperature as specified by the S&W loop diagrams.

14.2.12.1.30 Ventilation Chilled Water System Acceptance Test

1. Test Objectives

   To verify the capability of the ventilation chilled water system to supply chilled water to the cooling coils of the containment unit coolers, the fuel building unit coolers, the turbine building air handling units, and the radwaste, turbine building, AND ~~and drywell~~ unit coolers during normal and shutdown modes of operation.

2. Prerequisites

   a. Required preliminary tests complete 13

   b. All permanently installed instrumentation operable and properly calibrated

   c. Appropriate ac and dc power available

3. Test Procedures

   a. Verify all fan trips, permissives, interlocks, and controls.

   b. Verify emergency ventilation lead fans automatically start in response to their associated diesel generators starting and in response to high room temperature. Verify emergency ventilation standby fans start if lead fan trips. | 15

4. Acceptance Criteria

   a. All fan interlocks, trips, and permissives function as specified by the system elementary diagrams. | 5

   b. Emergency ventilation lead fans start automatically in response to their associated diesel generators starting and when room temperature exceeds the high temperature set point.

   c. Emergency ventilation standby fans automatically start upon lead fan trip. | 15

14.2.12.1.32 Drywell Cooling System Preoperational Test

1. Test Objective

   To demonstrate fan, damper, and unit cooler trips, permissives, interlocks, and controls function. | 15

(1) Instrument air

(2) Service air

(3) Radwaste auxiliary steam

3(~~4~~) Condensate makeup and drawoff

(5) Makeup water treatment

(6) Turbine plant component cooling

4(~~7~~) Floor and equipment drains

5(~~8~~) Radwaste building ventilation

3. Test Procedure

a. Demonstrate flow capabilities, control and interlock operations, and overall system operation using demineralized water.

b. Demonstrate the ability of the filters to be PURGED, ~~precoated,~~ backwashed, ~~recirculated,~~ and placed in normal operation.

c. Demonstrate the ability of the demineralizers to be backwashed, ~~recharged,~~ and placed in normal operation.

d. Demonstrate that the filters AND demineralizers, ~~and evaporators~~ produce acceptable water quality.

4. Acceptance Criteria

a. Flow capabilities, controls, and interlocks are as specified by FSAR Chapter 11, Table 11.2-1, and the system elementary diagrams.

5

b. ~~Precoat~~ filter operations are as specified by the manufacturer's technical instruction manual for the following modes:

(1) ~~Precoat~~ PURGE

(2) Backwash

(3) ~~Recirculation~~ FILTRATION

(4) Normal.

c. Demineralizer operations are as specified by the manufacturer's technical instruction manual for the following modes: 5

(1) Backwash

(2) Recharge

(3) Recirculation

2(4) Normal.

d. Filters AND demineralizers ~~and evaporators~~ operate as specified by the manufacturer's technical instruction manual. 5

14.2.12.1.41 480-V Distribution System Preoperational Test

1. Test Objectives

a. To demonstrate the functional capability of the 480-V load distribution centers and their incoming breakers, including their associated annunciation, computer alarms, and protection devices.

b. To demonstrate the functional capability of the 480-V transformers, including their monitoring and alarm capabilities.

c. To demonstrate the load carrying capability of load breakers, load breaker protective relay logic, load breaker permissive and prohibit interlocks and the monitoring of alarm devices which monitor the loss of control power in each of the system preoperational tests where the system contains 480-V breakers. 5

2. Prerequisites 13

a. Required preliminary testing complete

b. All instrumentation calibrated and operable

c. Ac and dc power available as required

3. Test Procedure

   a. Demonstrate operation of trips and transfer devices, permissive and prohibit interlocks, protective relaying, and logic for bus and load distribution center incoming breakers. Load shedding on bus undervoltage is demonstrated.

   b. Demonstrate trips, permissives, interlocks, controls, and alarms of the 13.8-kV/480-V and 4160-V/480-V transformers.

   c. Demonstrate trips, controls and alarms for motor control center (MCC) feeder breakers.

   d. Observe bus, load center and MCC voltages, both remote and local.

4. Acceptance Criteria

   a. All bus, load center, and MCC voltage variation is with ± 10 percent.

   b. Functional capability of transformers and feeder breakers is as specified by the
5 manufacturer's technical instruction manual.

   c. ~~All~~ SELECTED bus load breakers are shed on an undervoltage condition.

14.2.12.1.42 Containment Atmosphere Monitoring System Preoperational Test

1. Test Objective

   To demonstrate the operation of hydrogen analyzers, containment pressure instruments, containment
5 temperature instruments, and suppression pool level instruments.

2. Prerequisites

   a. Required preliminary tests completed

   b. Electrical power available

   c. Instrument calibrations and loop checks completed

4. Acceptance Criteria

The ability of the system to draw samples from the locations specified by the piping diagrams has been demonstrated. 5

14.2.12.1.60 Turbine Plant Sampling System Acceptance Test

1. Test Objectives

To verify the operation of the turbine plant sampling system

2. Prerequisites

a. Required preliminary testing complete 13

b. Ac and dc power available as appropriate

c. All permanently installed instrumentation properly calibrated and operable

d. Instrument air available

d ~~e~~. A source of suitable water available

3. Test Procedure

a. Verify correct flow paths.

b. Demonstrate correct operation of valves, temperature bath, reliefs, pressure regulators, and analyzer equipment.

c. Demonstrate correct operation of the condenser sampling pumps and sealing steam sample pumps.

4. Acceptance Criteria

The system has the ability to draw samples from the locations specified by the system piping diagrams. 5

14.2.12.1.61 Liquid Radwaste Sampling System Acceptance Test

1. Test Objectives

To verify the operation of the liquid radwaste sampling system

14.2.12.1.65 Solid Radwaste System Acceptance Test

1. Test Objectives

   Solid radwaste processing is performed by an outside contractor using a mobile solidification unit. The test verifies the operability of the unit interfacing requirements and functionally tests the mobile unit.

2. Prerequisites

   a. Ac and dc power is available.

   b. ~~Service~~ INSTRUMENT air is available.

   c. A source of demineralized water is available.

3. Test Procedure

   a. Verify all interfacing requirements between the mobile unit and the plant.

   b. Test mobile units are functionally verified.

4. Acceptance Criteria

   a. The mobile unit interfaces with the plant's solid radwaste system.

   b. The mobile unit performs as specified by the manufacturer's technical instruction manual. 5

14.2.12.1.66 Emergency Lighting System Acceptance Test

1. Test Objective

   a. To demonstrate that the station lighting systems are capable of providing lighting with power supplied from normal and standby ac sources or from an uninterruptible power system and battery pack systems.

   b. To demonstrate that the station lighting systems provide lighting intensities at levels recommended by the Illuminating Engineering Society and in accordance with current OSHA requirements.

c. Functionally demonstrate the ability of the systems to properly collect and dispose of drainage.

5 4. Acceptance Criteria

a. Interlocks, controls, and alarms performances are as specified by the system elementary diagrams.

b. Pump performance is comparable to that shown in the manufacturer's technical instruction manual.

14.2.12.1.69 Loose Parts Monitoring System

15 1. Test Objectives

15 a. To demonstrate proper operation of the Loose Parts Monitoring Equipment.

15 11 b. To collect data to use as baseline information during subsequent operation.

15 c. To verify alert (HIGH ALARM) level operation

INSERT 1

15 2. Prerequisites and Initial Conditions

13 The Loose Parts Monitoring System is connected to the reactor and instrumentation and control testing is complete. The Loose Parts Monitoring System channel checks ~~and functional tests~~ have been completed with acceptable results. ~~Reactor recirculation system is operable.~~

15 3. Test Procedure

DELETE AND REPLACE WITH INSERT 2

15 a. With the reactor recirculation system operational, record baseline data.

15 11 b. With the reactor recirculation system and the loose parts simulator operational, record simulated loose parts data.

15 c. Review test results and establish corresponding alert and alarm set points.

15 d. Perform Step 2 again to verify that alert function is operational and data acquisition equipment is automatically activated.

INSERT 1 FOR PAGE 14.2-124

NOTE: THE NORMAL OPERATING BASELINE DATA AND FINAL ALERT LEVEL SETTINGS ARE OBTAINED DURING POWER ASCENSION TESTING.

INSERT 2 FOR PAGE 14.2-124

a. SET THE SYSTEM TROUBLE (LOW) ALARM.

b. PERFORM SENSOR VERIFICATION AND SENSITIVITY MEASUREMENTS

c. ESTABLISH AND SET AN INITIAL ALERT (HIGH ALARM) LEVEL.

d. DEMONSTRATE AUTOMATIC DATA ACQUISITION UPON RECEIPT OF ALERT (HIGH ALARM) LEVEL.

4. Acceptance Criteria 15

Alert, (HIGH ALARM) AND ~~alarm, and~~ automatic data acquisition 11
equipment function as required upon receipt of a loose part signal reaching the alert level.

14.2.12.1.70 Safety-Related Ventilation Systems Environmental Design and Technical Requirement Preoperational Test

1. Test Objectives

   a. To demonstrate that filter trains meet test specification requirements.

   b. To demonstrate system ventilation capacities.

   c. To demonstrate the capability of the annulus pressure control system to operate in accordance with test specifications and to maintain negative pressure in the annulus.

   d. To demonstrate the standby gas treatment 15
   system's ability to maintain a negative pressure in the annulus and the auxiliary building.

   e. To demonstrate the ability of the turbine building, radwaste building, and safety-related ventilation systems to remove design heat loads.

   f. To demonstrate the ability of the turbine building, radwaste building, and certain safety-related ventilation systems to prevent the exfiltration of combustible gases and/or radioactive contamination into the surrounding area or atmosphere.

   g. To demonstrate that the main control room is maintained at a positive pressure with respect to the surrounding areas, and inleakage is within design limits while operating in the recirculation mode.

   h. To demonstrate the capability of the control building HVAC system to provide air flows, heating, and cooling to specified areas in the control building for the various modes of operation including post-accident conditions.

e. Reactor vessel status is specified relative to internal component placement and this placement established to make the vessel ready to receive fuel.

f. Reactor vessel water level is established and minimum level prescribed.

5 3. Test Procedure

Fuel loading begins at the center of the core and proceeds radially to the fully loaded configuration.

Control rod functional tests, AND subcriticality checks, ~~and shutdown margin demonstrations,~~ are performed periodically during the loading. SHUTDOWN MARGIN IS DEMONSTRATED IN THE PARTIALLY LOADED - 144 FUEL BUNDLE CONFIGURATION.

4. Acceptance Criteria

<u>Level 1</u>

The partially loaded core is subcritical by at least 0.38 percent $\Delta k/k$ with the analytically strongest rod fully withdrawn.

5 14.2.12.3.4 Test Number 4 - Full Core Shutdown Margin

1. Test Objective

The purpose of this test is to demonstrate that the reactor is subcritical throughout the first fuel cycle with any single control rod fully withdrawn.

2. Prerequisites

The appropriate preoperational tests have been completed. Also, the following prerequisites are complete prior to performing the full core shutdown margin tests:

5 a. The predicted critical rod position is available.

b. The standby liquid control system is available.

c. Nuclear instrumentation is available with
17|13 neutron count rate of at least 0.7 counts per

CONTROL ROD DRIVE SYSTEM TESTS

Action	Test Conditions: Reactor Pressure With Core Loaded (psig) 0	600	800	Rated	
Position indication	All				
Insert/withdraw					
A. Single CRD notch and continuous modes	All				17
B. Gang groups notch and continuous modes	All				17
Coupling	All				
Friction	All			4 ~~All~~[4]	
Individual CRD scram times	All[3]	4[1]	4[1]	All	17
Individual CRD scram times				4[1,2]	

[1] Refers to four CRDs selected for continuous monitoring based on slow normal accumulator pressure scram times as determined from preoperational testing or unusual operating characteristics. The "four selected CRDs" must be compatible with the requirements of both the withdrawal sequence and the installed rod movement limitation system. 17

[2] Scram times of the four selected CRDs will be determined at Test Conditions 1, ~~3,~~ and 6 ~~before or during~~ FOR planned reactor scrams (see Tests 25B, 27 and 28.) 17

[3] Credit can be taken for CRD scram times performed in conjunction with the CRD Hydraulic System Preoperational Test (14.2.12.1.11), provided that no modifications were done on the CRD after scram timing and the test was performed less than 120 days before fuel

loadings.

17 (4) Performing friction testing for 50 percent of the rods in a checkerboard pattern is acceptable to satisfy the rated pressure requirement.

NOTE: Single CRD scrams should be performed with the charging valve closed (Do not ride the charging pump head).

THE FOUR RODS UNDERGOING FRICTION TESTING AT RATED PRESSURE SHALL BE AMONG THOSE WHICH EXHIBITED HIGH dp DURING THE ZERO PRESSURE FRICTION TESTS.

Level 2

Each CRD must have a normal insert or withdraw speed of 3.0 plus or minus 0.6 in per sec, indicated by a full 12-ft stroke in 40 to 60 sec.

With respect to the CRD friction tests, if the differential pressure variation exceeds 15 psid for a continuous drive in, a settling test must be performed, in which case, the differential settling pressure should not be less than 30 psid nor should it vary by more than 10 psid over a full stroke.

(Note: The differential setting pressure should be nominally 5 psid higher at 00 position than at any other position along the control rod.) 5

The CRDs total cooling water flow rate is between 0.28 and 0.34 gpm times the total number of drives.

For vessel pressures below 950 psig, the maximum scram time of individual fully withdrawn CRDs complies with a figure provided in the startup test procedure (time versus reactor dome pressure). This is the time from the deenergizing of the scram solenoid valve to notch 11. 5

14.2.12.3.6 Test Number 6 - SRM Performance and Control Rod Sequence 5

1. Test Objective

The purpose of this test is to demonstrate that the operational sources, SRM instrumentation, and rod withdrawal sequences provide adequate information to achieve criticality and increase power in a safe and efficient manner. The effect of typical rod movements on reactor power is determined.

2. Prerequisites

The APPROPRIATE preoperational tests have been completed, and the FRC has reviewed and approved the test procedure and the initiation of testing. The CRD system must be operational.

3. Test Procedure

The operational neutron sources are installed and source range monitor count-rate data is taken during rod withdrawals to critical and compared with stated criteria on signal and signal count-to-noise count ratio.

A withdrawal sequence has been calculated which completely specifies control rod withdrawals from all-rods-in condition to the rated ~~power~~ PRESSURE
17 configuration.

Movement of rods in a prescribed sequence is monitored by the rod pattern control system which enforces specific rules based on power level, rod
17 sequence, and rod group.

4. Acceptance Criteria

Level 1

There is a neutron signal count-to-noise count ratio of at least 2 to 1 on the minimum number of operable SRMs or fuel loading chambers as specified in the Technical Specifications.

17 There is a minimum count rate of 0.7 counts/sec on the minimum number of operable SRMs or fuel loading
5 chambers as specified in the Technical Specifications.

The IRMs are on scale before the SRMs exceed the rod block set point.

5 14.2.12.3.7 Test Number 16B - Water Level Reference Leg Temperatures

1. Test Objective

The purposes of this test are a) to check the calibration of the various level indicators and b) to measure the reference leg temperature and recalibrate the affected wide range level

17 The Level 2 criteria determine whether
17 recalibration is necessary.

4. Acceptance Criteria

<u>Level 2</u>

17 The difference between the variable leg and the reference leg temperatures determined from the containment and drywell temperature measurements and the values assumed during initial calibration are less than the amount which will result in a scale endpoint error of 1 percent of the instrument span for each range.

5 14.2.12.3.8 Test Number 10 - Intermediate Range Monitor Performance

1. Test Objective

The purpose of this test is to adjust the IRM system to obtain an optimum overlap with the SRM and APRM systems.

2. Prerequisites

The APPROPRIATE preoperational tests have been completed. The FRC has reviewed and approved the test procedures and the initiation of testing. Instrumentation for calibration has been checked and installed.

3. Test Procedure

Initially the IRM system is set to maximum gain. After the APRM calibration, the IRM gains are adjusted to optimize the IRM overlap with the SRMs and APRMs.

4. Acceptance Criteria

<u>Level 1</u>

Each IRM channel is adjusted so that the overlap with the SRMs and APRMs is assured. The IRMs

produce a scram at less than or equal to the Technical Specification trip set point. 5

14.2.12.3.9 Test Number 11 - LPRM Calibration

1. Test Objective

The purpose of this test is to calibrate the LPRM system.

2. Prerequisites

The appropriate preoperational tests have been completed, the FRC has reviewed and approved the test procedures and the initiation of testing. Instrumentation for calibration has been checked and installed.

3. Test Procedure

The LPRM channels are calibrated to make the LPRM readings proportional to the neutron flux in the water gap at the chamber elevation. Calibration factors are obtained through the use of either an offline or a process computer calculation that relates the LPRM reading to average fuel assembly power at the chamber height.

4. Acceptance Criteria

Level 2

Each LPRM reading is within 10 percent of the value determined to be the average fuel assembly power at the chamber height. 5

14.2.12.3.10 Test Number 12 - APRM Calibration

1. Test Objective

The purpose of this test is to calibrate the average power range monitor system.

2. Prerequisites

APPROPRIATE

The preoperational tests have been completed and the FRC has reviewed and approved the test procedures and the initiation of testing. Instrumentation for calibration has been checked and installed.

2. Prerequisites

The APPROPRIATE preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Computer diagnostic test completed. Construction and construction testing on each input instrument and its cabling are completed.

3. Test Procedure

Computer system program verification and calculational program validations at static and at simulated dynamic input conditions are preoperationally tested at the computer supplier's site and following delivery to the plant site. Following fuel loading, during plant heatup and the ascension to rated power, the nuclear steam supply system and the balance-of-plant system process variables sensed by the computer as digital or analog signals become available. Verify that the computer is receiving correct values of sensed process variables and that the results of performance calculations of the nuclear steam supply system and the balance-of-plant are correct. At steady-state power conditions the dynamic system test case is performed.

4. Acceptance Criteria

Level 2

Programs OD-1, P1, and OD-6 are considered operational when:

a. The MCPR calculated by BUCLE and the process computer either:

   (1) Are in the same fuel assembly and do not differ in value by more than 2 percent or,

   (2) For the case in which the MCPR calculated by the process computer is in a different assembly than that calculated by BUCLE, for each assembly, the MCPR and CPR calculated by the two methods agree within 2 percent.

d. In order to provide an overspeed and isolation trip avoidance margin, the transient start first and subsequent speed peaks do not exceed
17 5 percent above the rated RCIC turbine speed.

14.2.12.3.13 Test Number 16A - Selected Process Temperatures

1. Test Objective

a. To assure that the measured bottom drain temperature corresponds to bottom head coolant
5 temperature during normal operations.

b. To identify any reactor operating modes that cause temperature stratification.

c. To determine the proper setting of the low flow control limiter for the recirculation pumps to avoid coolant temperature stratification in the reactor vessel bottom head region.

d. To familiarize plant personnel with the temperature differential limitations of the reactor system.

2. Prerequisites

The APPROPRIATE preoperational tests have been completed and the FRC has reviewed and approved the test procedures, and initiation of testing. System and test instrumentation have been calibrated.

3. Test Procedure

The adequacy of bottom drain line temperature sensors is determined by comparing them with recirculation loop temperature when core flow is 100 percent of rated.

During initial heatup while in hot standby, the
5 bottom drain line temperature and recirculation loop temperature are monitored as the recirculation flow is slowly lowered to either minimum stable flow or the low recirculation pump speed minimum valve position, whichever is greater. The effects of cleanup flow, CRD flow, and power level are investigated. Utilizing this data, it can be determined whether coolant temperature stratification occurs when the recirculation pumps

are on and, if so, what minimum recirculation flow prevents it.

Monitoring the preceding information during planned pump trips determines if temperature stratification 5
occurs in the idle recirculation loop or in the lower plenum when one or more loops are inactive.

All data are analyzed to determine if changes in operating procedures are required.

4. Acceptance Criteria

<u>Level 1</u>

The reactor recirculation pumps are not started nor flow increased unless the coolant temperatures between the steam dome and the bottom head drain are within 100°F.

The recirculation pump in an idle loop is not started unless the temperature differential between the reactor coolant within the idle and operating recirculation loops is less than or equal to 50°F, and the operating loop flow rate is less than or equal to 50 percent rated loop flow.

14.2.12.3.14 Test Number 17 - System Expansion

1. Test Objective

The purpose of the thermal expansion test is to
confirm that the pipe suspension system is working 5
as designed and that the pipe is free of obstructions that could constrain free pipe movement.

2. Prerequisites

The APPROPRIATE preoperational tests are complete; the FRC has reviewed and approved the test procedure and initiation of testing. Instrumentation has been installed and calibrated.

3. Test Procedure

The thermal expansion tests consist of measuring displacements and temperatures of piping during various operating modes. The first power level used to verify expansion is as low as practicable.

4. Acceptance Criteria

Level 1

The transient response for neutron monitoring
5 variables to any test input (pressure regulator
change and control rod movement) does not diverge.

14.2.12.3.19 Test Number 22 - Initial Pressure Controller

1. Test Objective

The purposes of this test are: a) to determine the optimum settings for the initial pressure control (IPC) loop by analysis of the transients induced in the reactor pressure control system by means of the pressure controller, b) to demonstrate the capability of the IPC to maintain stable pressure control for various IPC single failure situations, and c) to demonstrate smooth pressure control transition between the control valves and bypass valves when reactor steam generation exceeds steam used by the turbine.

2. Prerequisites

The APPROPRIATE preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

The pressure set point is decreased rapidly and then increased rapidly by several psi and the response of the system is measured in each case. It is desirable to accomplish the set point change in less than 1 sec. At specified test conditions the load limit set point is set so that the transient is handled by control valves, bypass valves and both. Various inputs to the IPC averaging and comparison circuits are failed, and the ability of the IPC to maintain stable reactor pressure is demonstrated. The response of the system is measured and evaluated and IPC settings are optimized.

14.2.12.3.20.2 Test Number 23A - Water Level Set Point, Manual Feedwater Flow Changes 5

1. Test Objective

   The purpose of this test is to verify that the feedwater system has been adjusted to provide acceptable reactor water level control.

2. Prerequisites

   The APPROPRIATE preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

   Reactor water level set point changes of approximately 3 to 6 in are used to evaluate (and adjust as necessary) the feedwater control system settings for all power and feedwater level control valve modes. The level set point changes also demonstrate core stability to subcooling changes. 5 17

4. Acceptance Criteria

   <u>Level 1</u>

   The transient response of any level control system-related variable (reactor water level) to any test input does not diverge. 5

   <u>Level 2</u>

   a. Level control system-related variable may contain oscillatory modes of response. In these cases, the decay ratio for each controlled mode of response is less than or equal to 0.25.

   b. The open loop dynamic valve position response of each feedwater level control valve to small (<10 percent) step disturbances is: 17

      (1) Maximum time to 10 percent of a step disturbance: ≤ 1.1 sec 5

5 (2) Maximum time from 10 percent to 90 percent of a step disturbance: ≤ 1.9 sec

5 (3) Peak overshoot (percent of step disturbance): ≤ 15 percent

17 13 c. The ~~average~~ MAXIMUM rate of response of the total feedwater flow ~~actuator~~ to large (≥20 percent of pump flow) step disturbances is between 3.3 and 8.3 percent nuclear boiler rated (NBR) feedwater flow/sec. This ~~average~~ response rate is assessed by determining the ~~time required to pass linearly through the 10 and 90 percent response points.~~

MAXIMUM SLOPE OF THE FEED-WATER FLOW VS. TIME CURVE.

13 d. At steady-state operation, input scaling to the mismatch gains is adjusted such that the mismatch gain output within ± 1 inch.

5 14.2.12.3.20.3 Test Number 23B - Loss of Feedwater Heating

1. Test Objective

The purpose of this test is to demonstrate adequate response to a feedwater temperature loss.

2. Prerequisites

The appropriate preoperational tests have been completed; the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

The condensate/feedwater system is studied to determine the single failure that causes the largest loss in feedwater heating. This event is then performed at between 80 and 90 percent power with the recirculation flow near its rated value.

4. Acceptance Criteria

Level 1

5 The increase in simulated heat flux does not exceed the Level 2 value by more than 2 percent. This value is based on the actual test values of feedwater temperature change and power level.

14.2.12.3.22 Test Number 25 - Main Steam Isolation Valves 5

14.2.12.3.22.1 Test Number 25A - MSIV Functional Tests 13 17

1. Test Objective

   The purposes of this test are: a) to functionally check the MSIVs for proper operation at selected power levels, b) to determine isolation valve closure time at rated conditions, and c) to determine maximum power at which a single valve closure can be made without scram. 13

2. Prerequisites

   APPROPRIATE
   The preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

   At approximately 5 percent and greater power levels, individual fast closure of each MSIV will be performed to verify their functional performance and to determine closure times. The times to be determined are the time from deenergizing the solenoids until the valve is 100 percent closed (tsol), and, the valve stroke time (ts). Time tsol equals the interval from deenergizing the solenoid until the valve reaches 90 percent closed plus 1/8 times the interval from 10 percent to 90 percent closure. Time ts equals the interval from when the valve starts to move until it is 100 percent closed, and is based on the interval from 10 percent to 90 percent closure and linear valve travel from 0 percent to 100 percent closure. 17

   To determine the maximum power level at which full individual closures can be performed without a scram, first actuation is performed between 40 and 65 percent power and used to extrapolate to the next test point between 60 and 85 percent power, and ultimately to the maximum power test condition with ample margin to scram. 13

17

Level 2

During full closure of the individual valve, peak pressure is 10 psi below scram, peak neutron flux
5 is 7.5 percent below scram, and steam flow in individual lines is 10 percent below isolation valve trip setting. The peak heat flux is 5 percent less than its trip point.

14.2.12.3.22.2 Test Number 25B - Full Reactor Isolation

1. Test Objective

The purpose of this test is to determine the reactor transient behavior that results from the simultaneous full closure of all MSIVs.

2. Prerequisites

The APPROPRIATE preoperational tests have been completed; the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has
13 been checked or calibrated as appropriate.

3. Test Procedure

A test of the simultaneous full closure of all MSIVs is performed at 95 to 100 percent of rated thermal power. Correct performance of the RCIC and relief valves is shown. Reactor process variables are monitored to determine the transient behavior of the system during and following the main steam line isolation.

4. Acceptance Criteria

Level 1

The positive change in vessel dome pressure occurring within 30 seconds after closure of all MSIVs does not exceed the Level 2 criteria by more than 25 psi. The positive change in simulated heat

2. Prerequisites

APPROPRIATE
The preoperational tests have been completed; the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

Beginning at approximately 40 percent core thermal power, pertinent plant data is taken along the 75 percent rod line at selected power levels. The same process is repeated along the 100 percent rod line. The accumulated data is then compared against the calibration curves and a known flow source to verify that acceptable steam flow measurements have been made.

4. Acceptance Criteria

<u>Level 1</u>

Not applicable

<u>Level 2</u>

The flow venturi dp is equal to or greater than 79.3 psi at rated steam flow.

13 14.2.12.3.22.4 Test Number 25D - Main Steam Line Elbow Tap Calibration

1. Test Objective

The purpose of this test is to investigate the performance of the main steam line elbow taps at selected power levels over the entire core flow range. With the accumulated data, the main steam line elbow tap instrumentation is calibrated to accurately reflect the process flows.

2. Prerequisites

APPROPRIATE
The preoperational tests have been completed; the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

13

14.2.12.3.23 Test Number 26 - Relief Valves 5

1. Test Objectives

   The purposes of this test are: a) to verify that the relief valves function properly (can be open and closed manually), b) to verify that the relief valves reseat properly after operation, c) to verify that there are no major blockages in the relief valve discharge piping, and d) to confirm proper overall functioning of the low-low set pressure relief logic.

2. Prerequisites

   APPROPRIATE

   The preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

   A functional test of each SRV is made as early in the startup program as practical. This is normally the first time the plant reaches 250 psig. The test is then repeated at rated reactor pressure. Bypass valves (BPV) response is monitored during the low pressure test and the electrical output response is monitored during the rated pressure test. The test duration is about 10 sec to allow turbine valves and tailpipe sensors to reach a steady state.

   The tailpipe sensor responses are used to detect the opening and subsequent closure of each SRV. The BPV and power level (MWe) responses are analyzed for anomolies indicating a restriction in an SRV tailpipe. In addition, lead BWR plants measure SRV tailpipe back pressure on the longest and shortest tailpipes.

   Valve capacity is based on certification by ASME code stamp and the applicable documentation being available in the onsite records. Note that the nameplate capacity/pressure rating assumes that the

3. Test Procedure

Turbine trip (closure of the main turbine stop
valves within approximately 0.1 sec) and generator
trip (closure of the main turbine control valves in
about 0.1 to 0.2 sec) are performed at selected
power levels. A generator trip is performed at low
power level such that steam generation is just
within bypass valve capacity to demonstrate scram
avoidance. ~~At an intermediate power level, in~~
5 ~~excess of bypass capacity, a turbine trip is~~
~~performed, and the response of the plant to this~~
~~trip and scram is determined.~~

The accident analysis shows the generator trip to
be more limiting than the turbine trip. Therefore,
a generator trip is performed at full rated power.
The trip is initiated by an electrical signal
condition indicating a generator trip is required.
The turbine generator overspeed response is
monitored. Other parameters, such as reactor power
and pressure, are also monitored.

4. Acceptance Criteria

Level 1

For turbine and generator trips there is a delay of
less than 0.1 sec following the beginning of
control or stop valve closure before the beginning
5 of bypass valve opening. The bypass valves are
opened to a point corresponding to greater than
80 percent of their capacity within 0.3 sec from
the beginning of control or stop valve closure
motion.

Feedwater system settings prevent flooding of the
steam line following these transients.

The positive change in vessel dome pressure
occurring within 30 sec after either generator or
turbine trip does not exceed the Level 2 criteria
by more than 25 psi.

5 The positive change in simulated heat flux does not
exceed the Level 2 criteria by more than 2 percent.

Level 2

During a simulated main control room evacuation, the reactor is brought to the point where cooldown is initiated and under control. The reactor vessel pressure and water level are controlled using equipment and controls outside the main control room.

The plant is brought to hot standby and subsequently, but not necessarily immediately, it is demonstrated by partially cooling down the plant with RHR in the shutdown cooling mode that cold shutdown could be achieved using equipment and controls outside the main control room.

14.2.12.3.26 Test Number 29 - Recirculation Flow Control

14.2.12.3.26.1 Test Number 29A - Valve Position Control

1. Test Objective

   The purpose of this test is to demonstrate the capability of the recirculation flow control system when in the position command mode.

2. Prerequisites

   APPROPRIATE
   The preoperational tests have been completed; the FRC has reviewed and approved the test procedures and initiation of testing. All controls are checked and instrumentation calibrated. 5

3. Test Procedure

   The testing of the recirculation flow control system follows a "building block" approach while the plant is ascending from low- to high-power levels. Components and inner control loops are tested first, followed by drive flow control and plant power maneuvers to adjust and then demonstrate the outer loop controller performance. While operating at low power, with the pumps using the low frequency power supply, small step changes are input into the position controller and the response recorded.

14.2.12.3.27 Test Number 30 - Recirculation System

14.2.12.3.27.1 Test Number 30A - One Pump Trip

1. Test Objective

   The purposes of this test are a) to obtain recirculation system performance data during the pump trip, flow coastdown, and pump restart, and b) to verify that the feedwater control system can satisfactorily control water level without a resulting turbine trip/scram.

2. Prerequisites

   The appropriate preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

   A ~~S~~single recirculation pump trip~~s~~ (RPT) is ~~(RPTs) are~~ made at A designated power level~~s~~. (AT OR ABOVE 75% POWER) Reactor operating parameters, such as water level, simulated heat flux, and APRM level, are recorded during the transient to determine margins with respect to limits.

4. Acceptance Criteria

   Level 1

   Not applicable.

   Level 2

   a. The reactor water level margin to avoid a high level trip is greater than or equal to 3.0 in during the one pump trip.

   b. The simulated heat flux margin to avoid a scram is greater than or equal to 5.0 percent during the one pump trip for recovery.

   c. The APRM margin to avoid a scram is greater than or equal to 7.5 percent during the one pump trip recovery.

14.2.12.3.27.2 Test Number 30B - Trip of Two Pumps 5

1. Test Objective

The purpose of the test is to record and verify acceptable performance of the recirculation two-pump trip.

2. **Prerequisites**

The appropriate preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

Both recirculation pumps are tripped at the desired power level, and the flow coastdown transient is recorded. 5

4. Acceptance Criteria

<u>Level 1</u>

The two-pump drive flow coastdown transient during the first 5 sec is equal to or greater than that specified on Fig. 14.2-6. 5 16

14.2.12.3.27.3 Test Number 30C - System Performance 5

1. Test Objective

The purpose of this test is to record recirculation system parameters during the power test program.

2. Prerequisites

APPROPRIATE

The preoperational tests are complete. The FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

Recirculation system parameters are recorded at several power-flow conditions and in conjunction with single pump trip recoveries.

Level 2

The maximum reactor pressure is more than 40 psi below the first safety valve set point, during the transient following the loss of the main generator and all offsite power. Normal reactor cooling systems are able to maintain adequate suppression pool water temperature, maintain adequate drywell cooling, and prevent actuation of the automatic depressurization system.

14.2.12.3.29 Test Number 33 - Drywell Piping Vibration

1. Test Objective

   The purpose of this test is to verify that the main steam, recirculation, and RCIC steam piping vibration are within acceptable limits and to verify that, during operating transient loads, pipe stresses are within code limits.

2. Prerequisites

   APPROPRIATE

   The preoperational tests are complete; the FRC has reviewed and approved the test procedure and initiation of testing. Instrumentation has been installed and calibrated.

3. Test Procedure

   This test is an extension of Test Number 17 (Section 14.2.12.4.14), system expansion, and the preoperational vibration tests. Consult the specification of Test 17 for piping considered to be within the scope of testing. 5

   Because of limited access due to high-radiation levels, no visual observation is required during the startup phase of the testing. Remote measurements of piping vibration are made during the following steady-state conditions:

   a. Recirculation flow at minimum flow.

   b. Recirculation flow at 50 percent of rated.

   c. Recirculation flow at 75 percent of rated.

   d. Recirculation and main steam flow at 100 percent of rated.

APRM/RBM (rod block monitor) system is adjusted to match this relationship.

4. Acceptance Criteria

<u>Level 1</u>

Not applicable.

<u>Level 2</u>

Jet pump flow instrumentation is adjusted such that the jet pump total flow recorder provides a correct core flow indication at 100 percent power,
5 100 percent drive flow.

The APRM/RBM flow-bias instrumentations is adjusted to function properly at 100 percent power, 100 percent drive flow.

5 The flow control system is adjusted to limit the maximum core flow to 102.5 percent of rated by limiting the flow control valve opening position.

5 14.2.12.3.31 Test Number 70 - Reactor Water Cleanup System

1. Test Objective

The purpose of this test is to demonstrate specific aspects of the mechanical ability of the RWCU. (This test, performed at rated reactor pressure and temperature, is actually the completion of the preoperational testing that could not be done without nuclear heating.)

2. Prerequisites

APPROPRIATE
The preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

With the reactor at rated temperature and pressure, process variables are recorded during steady-state operation in three modes as defined by the system process diagram: blowdown, hot standby, and normal.

4. Acceptance Criteria

Level 1

Not applicable.

Level 2

The temperature at the tube side of the nonregenerative heat exchangers does not exceed 130°F in any mode.

The pump available NPSH during the hot standby mode is equal to or greater than that defined in the process diagrams. 17

14.2.12.3.32 Test Number 71 - Residual Heat Removal System 5

1. Test Objective

The purpose of this test is to demonstrate the ability of the RHR system to a) remove heat from the reactor system so that the refueling and nuclear system servicing can be performed, and b) condense steam while the reactor is isolated from the main condenser.

2. Prerequisites

The appropriate preoperational tests have been completed and the FRC has reviewed and approved the test procedures and initiation of testing. Instrumentation has been checked or calibrated as appropriate.

3. Test Procedure

With the reactor at heat up or Test Condition 1, 17
the condensing mode of the RHR system is tuned and demonstrated. Condensing heat exchanger performance characteristics are demonstrated. 13
Final demonstration of the condensing mode is done from an isolated condition. During the first suitable reactor cooldown, the shutdown cooling mode of the RHR system is demonstrated. THE SUPPRESSION POOL COOLING MODE IS TESTED IN THE PREOPERATIONAL TEST (SEE SECTION 14.2.12.1.5).

13 4. Acceptance Criteria

<u>Level 1</u>

Not applicable.

<u>Level 2</u>

5 The RHR system is capable of operating in the ~~suppression pool cooling mode and~~ shutdown cooling mode at the flow rates and temperature differentials specified by the GE process diagrams.

The RHR system is capable of operating in the steam condensing mode (with both one and two heat exchangers) at the flow rates indicated on the GE process diagrams.

17 5 14.2.12.3.33 Test Number 103 - Drywell Atmosphere Cooling System

1. Test Objective

The purpose of this test is to verify the ability of the drywell atmosphere cooling system to maintain test conditions in the drywell during operating conditions and post-scram conditions.

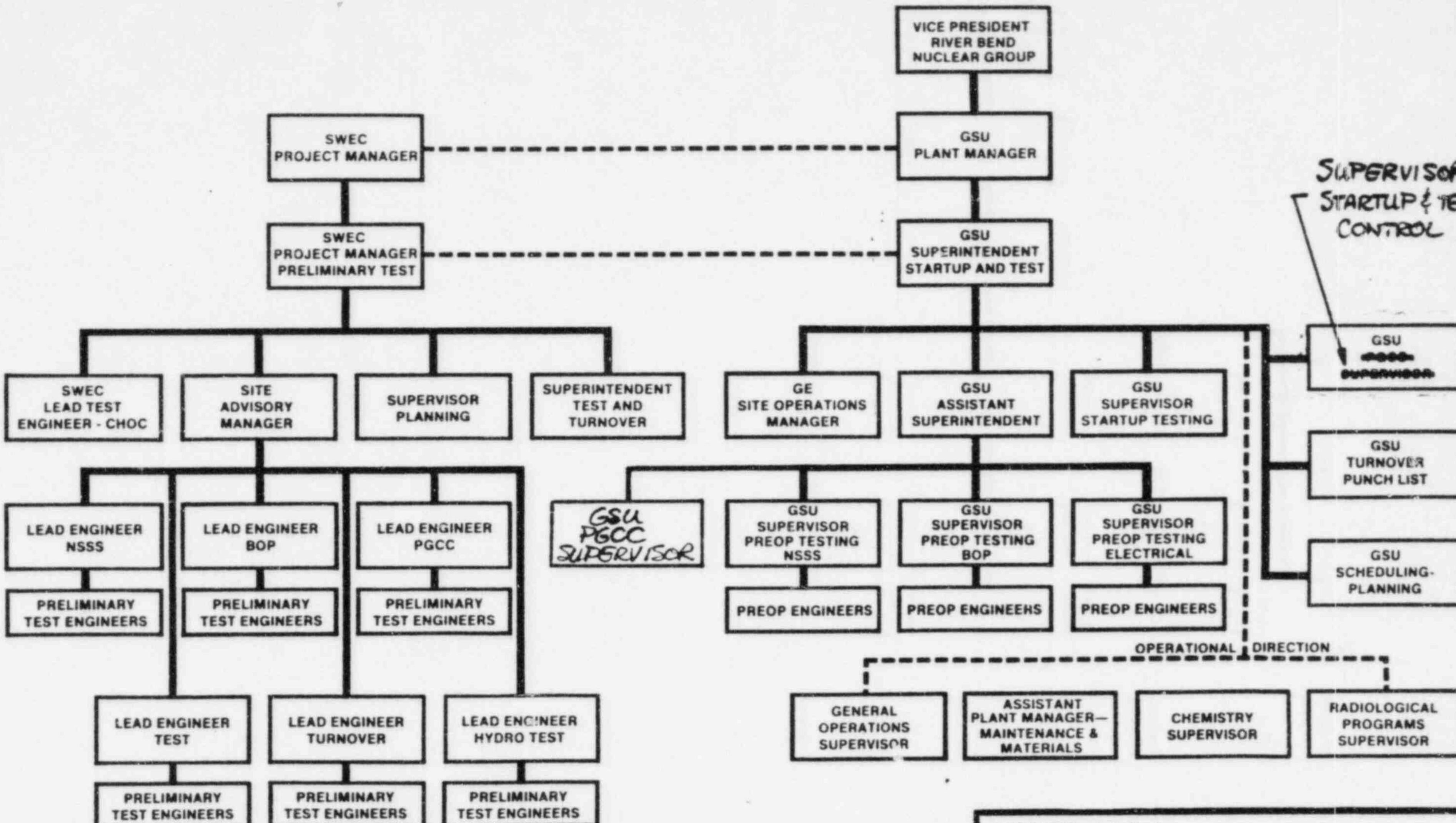

FIGURE 14.2-1

START-UP ORGANIZATION

RIVER BEND STATION
FINAL SAFETY ANALYSIS REPORT

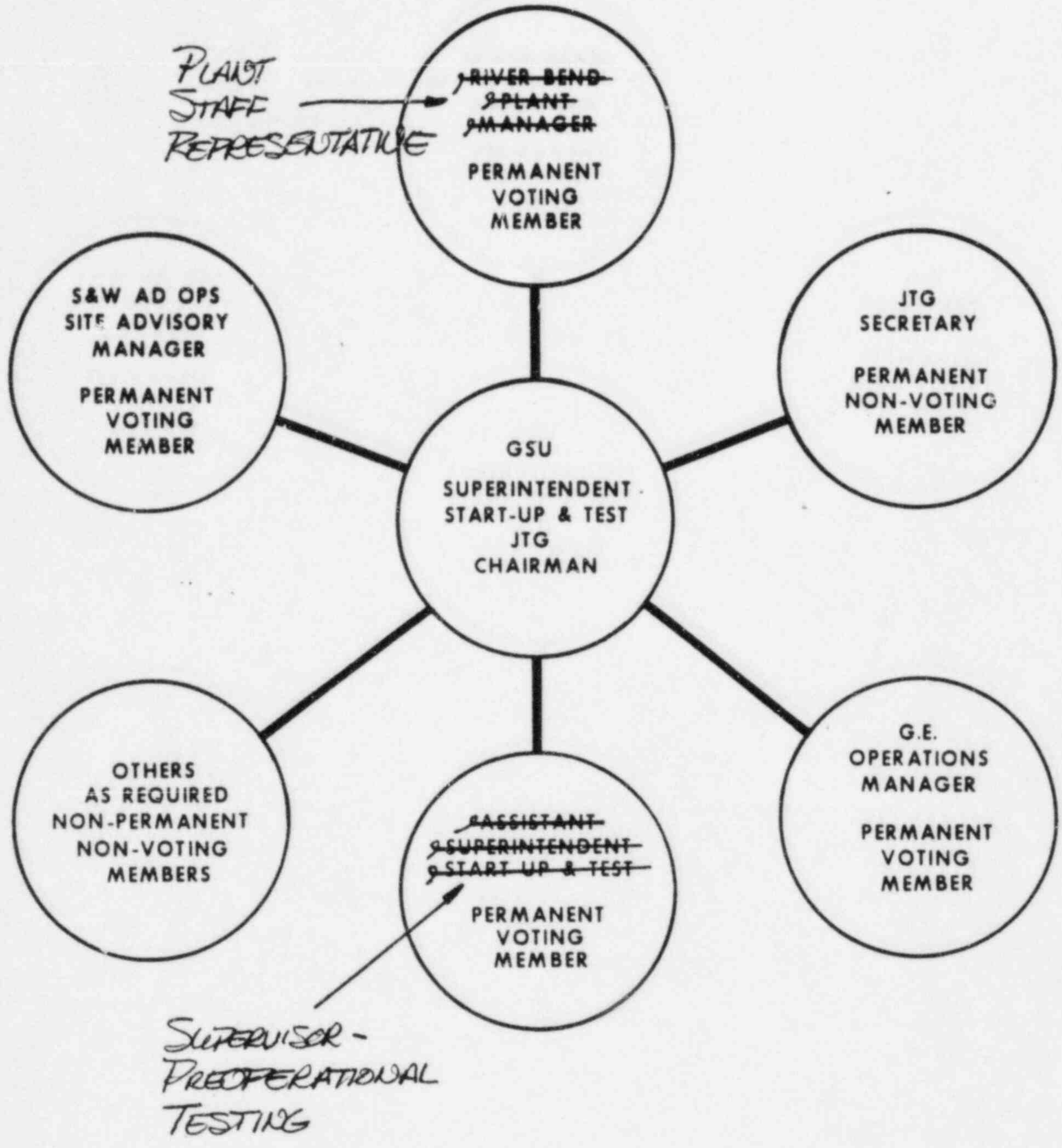

FIGURE 14.2-2

JOINT TEST GROUP (JTG)

RIVER BEND STATION
FINAL SAFETY ANALYSIS REPORT

TEST NO.	TEST NAME	OPEN VESSEL	HEAT UP	TEST CONDITIONS 1	2	3	4	5	6	WARRANTY
1	CHEMICAL AND RADIOCHEMICAL	X	X	X		X			X	
2	RADIATION MEASUREMENT	X	X	X		X			X	
3	FUEL LOADING	X								
4	FULL CORE SHUTDOWN MARGIN	X								
5	CONTROL ROD DRIVE SYSTEM	X	X	X					X	
6	SRM PERFORMANCE	X								
10	IRM PERFORMANCE		X	X						
11	LPRM CALIBRATION		X	X					X	
12	APRM CALIBRATION		X	X	X	X		X	X	
13	PROCESS COMPUTER (25)		X	X					X	
14	RCIC SYSTEM		X	X	X					
16A	SELECTED PROCESS TEMPERATURES NOT		X			X			X	
16B	WATER LEVEL REF LEG TEMPS (26)		X						X	
17	SYSTEM EXPANSION		X	X	X					
18	TIP UNCERTAINTY					X			X	
19	CORE PERFORMANCE			X	X	X	X	X	X	
20	STEAM PRODUCTION									X
21	CORE POWER-VOID MODE RESPONSE						X	X		
22	PRESSURE REGULATOR			X	X	X	X	X	X	
23A	WATER LEVEL SETPOINT CHANGES				X	X	X	X	X	
23B	FEEDWATER SYS-LOSS OF FW HEATING								X	
23C	FEEDWATER SYS-PUMP TRIP								X	
23D	FEEDWATER SYS-MAX RUNOUT CAPABILITY								X	
24	TURBINE VALVE SURVEILLANCE					X		X	X	
25A	MSIV FUNCTIONAL TEST		X	X	X			X	X	
25B	MSIV FULL CLOSURE								X	(29)
25C	MAIN STEAM LINE FLOW VENTURI CALIB					X			X	
25D	MAIN STEAM LINE ELBOW TAP CALIB					X			X	
26	RELIEF VALVES		X		X					
27	TURBINE TRIP AND GENERATOR LOAD REJECTION			X					X	(29)
28	SHUTDOWN FROM OUTSIDE CONTROL ROOM			X						
29	RECIRCULATION FLOW CONTROL	X		X	X	X		X		
30A	RECIRCULATION SYSTEM-ONE PUMP TRIP					X				
30B	RECIRCULATION SYSTEM-TWO PUMP TRIP					X				
30C	RECIRCULATION SYSTEM PERFORMANCE					X			X	
30D	RECIRCULATION SYSTEM-PUMP RUNBACK					X				
30E	RECIRCULATION SYSTEM CAVITATION				X	X				
31	LOSS OF TURB GENERATOR & OFFSITE PWR				X					
33	DRYWELL PIPING VIBRATION		X	X		X			X	
35	RECIRCULATION SYSTEM FLOW CALIBRATION					X			X	
70	REACTOR WATER CLEANUP SYSTEM		X							
71	RESIDUAL HEAT REMOVAL SYSTEM		X						X	
103	DRYWELL ATMOSPHERE COOLING SYSTEM		X						X	
105	PENETRATION TEMPERATURE		X							

NOTES

(1) TEST CONDITIONS REFER TO CONDITIONS STATED ON FIGURE 14.2-4 OF THE FSAR
(2) TEST NUMBER INFERS THE SECTIONS NUMBERS OF SECTION 14.2.12.3. OF THE FSAR
(3) PERFORM TEST 5. TIMING OF 4 SLOWEST CONTROL RODS IN CONJUNCTION WITH EXPECTED SCRAMS
(4) TO BE COMPLETED BETWEEN TEST CONDITIONS 1 AND 3
(5) AFTER RECIRC PUMP TRIPS
(6) DOWN SETPOINT ONLY
(7) NU BYPASS VALVE RESPONSE
(8) NO CONTROL VALVE RESPONSE
(9) BETWEEN 80% AND 90% POWER
(10) BETWEEN TEST CONDITIONS 5 AND 6. BETWEEN 70% AND 90% POWER
(11) AT MAXIMUM POWER THAT WILL NOT CAUSE SCRAM
(12) ON ASCENSION TO TEST CONDITIONS
(13) BETWEEN 40% AND 55% POWER
(14) BETWEEN 60% AND 85% POWER
(15) BETWEEN TEST CONDITIONS 2 AND 3
(16) GREATER THAN 75% POWER. FULL ISOLATION
(17) GENERATOR LOAD REJECTION. WITHIN BYPASS SYSTEM CAPACITY
~~(18) [illegible]~~
(19) ~~TURBINE TRIP OR~~ GENERATOR LOAD REJECT
(20) AT STEADY STATE AND IN CONJUNCTION WITH NOTE 27
(21) DEMONSTRATON OF STEAM CONDENSING
(22) AFTER TRIP OR COOLDOWN FROM TEST CONDITION 6
(23) SINGLE VALVE
(24) MAY BE DEFERRED UNTIL WARRANTY
(25) RESPONSE CHECK ONLY
(26) REFERS TO RCIC COLD QUICK STARTS ONLY
(27) INSPECTION AFTER 2ND AND 3RD THERMAL CYCLE
(28) MAY BE DONE AT TEST CONDITION 3 INSTEAD
(29) SRV LOW-LOW SET LOGIC VERIFICATION

FIGURE 14.2-5

STARTUP TEST PROGRAM

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utilizes appropriate seismic floor response spectra and combines loads at frequencies up to 33 Hz in three directions. Imposed stresses are generated and combined for normal, upset, and faulted conditions. Stresses are compared, depending on the specific safety class of the equipment, to Industrial Codes, ASME, ANSI or Industrial Standards, AISC, allowables.

3.9.2B Dynamic Testing and Analysis

3.9.2.1B Piping Vibration, Thermal Expansion, and Dynamic Effects

The test program is divided into three phases: piping vibration, thermal expansion, and dynamic effects.

3.9.2.1.1B Piping Vibration

3.9.2.1.1.1B Preoperational Vibration Testing of Recirculation Piping

The purpose of the preoperational vibration test phase is to verify that operating vibrations in the recirculation piping are within acceptable limits. This phase of the test uses ~~visual observation to supplement~~ remote measurements. ~~If, during steady state operation, visual observation indicates that vibration is significant, measurements are made with a hand held vibrograph. Visual observations, manual and~~ remote measurements are made during the following steady-state conditions:

1. Recirculation pumps minimum flow
2. Recirculation pumps at ~~50% of rated~~ INTERMEDIATE flow
3. Recirculation pumps at ~~75% of rated~~ MAXIMUM STABLE PREOPERATIONAL flow
4. ~~Recirculation pumps at 100% of rated flow.~~

1 Section 3.9.2.1A further discusses preoperational vibration testing, including measurement locations and visual inspection points.

3.9.2.1.1.2B Startup Vibration Testing of Main Steam and Recirculation Piping

The purpose of this phase of the program is to verify that the main steam and recirculation piping vibration are within acceptable limits. Because of limited access due to high