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MURRAY R. EDELMAN
VICE PRESIDENT
NUCLEAR

April 29, 1985
PY-CEI/NRR-0207L

Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Perry Nuclear Power Plant
Docket Nos. 50-440; 50-441
Response to Additional Staff
Questions Pertaining to the
PNPP Initial Test Program

Dear Mr. Youngblood:

This letter and its attachments are provided in response to your staff's questions (dated February 21, 1985) pertaining to the Initial Test Program for the Perry Nuclear Power Plant.

The information provided in the attachments will be incorporated into a future amendment to the FSAR. Also attached is a list of references for the Preoperational Test Program. If you have any questions, please feel free to call.

Very truly yours,

A. Edelman for

Murray R. Edelman
Vice President
Nuclear Group

MRE:njc

Attachments

cc: Jay Silberg, Esq.
John Stefano (2)
J. Grobe
S. Brown



A001
1/1

640.57
(640.4)
(14.2.11)

Modify the Test Program schedule (FSAR Section 14.2.11) to reinstate that preoperational and acceptance test results should be reviewed and approved prior to fuel load, and that if any tests should be deferred until after fuel load, the following information and justification will be provided to the NRC: (1) a list of tests involved, (2) technical justification for these portions, and (3) anticipated completion date for each test.

Response

Section 14.2.11 (attached) has been revised to reflect these requirements.

The general sequence showing major Testing Milestones is given in Figure 14.2-5. A Test Sequence Document showing detailed testing activity interface has been prepared and distributed at the Perry site. This document is available for review at the Perry site.

Preoperational and acceptance testing is scheduled to be complete prior to fuel load. Preoperational and acceptance testing shall be completed and the results reviewed, evaluated and approved prior to the time that a system, subsystem or component will be relied on to maintain the plant in a safe condition, and prior to entering an operating condition for which a system, subsystem or component is required to be operable. If any tests should be deferred until after fuel load, the following information and justification will be provided to the NRC: (1) a list of all tests or portions of tests involved, (2) technical justification for these portions and (3) a schedule for completion of each test.

Preoperational and acceptance tests that are completed or partially completed after fuel load shall be subject to the startup test administrative controls except that the procedure need not be revised to accommodate any format requirements.

640.58 (640.6) (1.8) (14.2.12) The Standby Diesel Generator Preoperational Test (FSAR Subsection 14.2.12.1.31), or other test abstracts as appropriate, should be modified to reflect the following positions stated in Regulatory Guide 1.108, or FSAR Table 1.8-1 should be modified to provide expanded technical justification for any exception to this guide.

(1) Expand testing to explicitly cover testing of HPCS diesel (C.2.a).

(2) Correct FSAR Table 1.8-1 to delete the exception to performing the full-load-carrying capability test for 2 hours at the 2-hour load rating. Note that the Standby Diesel Generator Test properly incorporates testing at the 2-hour load rating (C.2.a.3).

Response

(1) HPCS Diesel Generator testing has been added to Section 14.2.12.1.15.

(2) Amendment 17 to PNPP's FSAR deleted the two hour 110 percent of continuous rated load test from the Division 1 and 2 diesel generator testing. Table 1.8-1 has been modified to provide expanded technical justification.

14.2.12.1.1 High Pressure Core Spray System (HPCS) Preoperational Test

a. Test Objectives

1. High Pressure Core Spray System (excluding HPCS diesel generator)

a) To verify the ability of the High Pressure Core Spray System to perform within design specifications in all modes.

b) To verify the proper operation of all controls, interlocks, alarms, and logic (including automatic initiation).

2. High Pressure Core Spray Diesel Generator

a) To demonstrate that the HPCS diesel generator is capable of providing reliable electrical power during normal and simulated accident conditions.

b) To demonstrate the operability of the HPCS diesel generator auxiliary systems (e.g., starting air, fuel oil, jacket water, lube oil, intake air supply, and exhaust system).

b. Prerequisites

1. High Pressure Core Spray System (excluding HPCS diesel generator)

a) Individual component tests are complete.

b) Instrument calibration has been completed.

c) Electrical power is available.

d) The suppression pool and condensate storage tank are filled above the low water level to provide suction to the pump.

2. High Pressure Core Spray Diesel Generator

a) Individual component tests are complete and have been approved.

b) Instrumentation is available, calibrated and operable.

c) Sufficient diesel fuel is available.

d) Engine liquid levels are sufficient to allow operation, e.g., lubrication oil and jacket water.

e) The following systems and/or components are available:

1) Pneumatic sources.

2) Emergency service water.

3) Electrical power.

4) HPCS diesel generator room fire protection.

5) HPCS diesel generator room ventilation.

6) HPCS diesel generator auxiliary systems are available.

c. Test Procedure

1. High Pressure Core Spray System (excluding HPCS diesel generator)

a) Controls, alarms and interlocks are functionally tested.

b) System operation will be conducted in all modes of operation and **includes** automatic transfer of pump suction from the condensate storage tank to the suppression pool for both modes of initiation (high suppression pool level and low condensate storage tank level).

c) Pump head flow characteristics and NPSH are checked for consistency and design specifications for the various modes of operation.

d) System performance is determined.

e) Simulated signals will be used to demonstrate emergency initiation.

f) The water leg pump will be operated to maintain full HPCS pump discharge line.

2. High Pressure Core Spray Diesel Generator

a) Manual and automatic operation is performed which includes operation of the auxiliary system.

b) The largest single load and subsequently all loads are tripped from the HPCS diesel generator.

c) The required consecutive start and load tests are performed.

d) Full-load operation of the HPCS diesel generator is performed for at least 24 hours.

e) The rate of fuel consumption is measured.

f) Controls, alarms, and interlocks are functionally tested.

d. Acceptance Criteria

1. High Pressure Core Spray System (excluding HPCS diesel generator)

a) System automatic initiation operates properly.

b) Controls affecting the transfer of the HPCS pump suction water supplies operate properly.

c) System alarms operate properly.

d) System flow rates are within design specifications and NPSH is within specified limits for the various modes of operation.

e) Core spray pattern is acceptable.

f) Automatic systems function as per design specifications including valve sequencing, cycle times, and automatic initiation.

g) The water leg pump is capable of maintaining a full HPCS pump discharge line.

2. High Pressure Core Spray Diesel Generator

a) Auxiliary systems operate properly.

b) HPCS diesel generator is automatically started on a simulated automatic actuation signal and attains required voltage and frequency within an acceptable time period.

c) Specified speeds and voltages are not exceeded during required load rejections.

d) HPCS diesel generator operates properly during the 24-hour load tests and temperatures are acceptable. This includes 2 hours at 110 percent of continuous rated load.

e) HPCS diesel generator maintains the required voltage and frequency during the 24-hour load test and a successful start functional capability test is performed at the completion of the 24-hour load test (within approximately 5 minutes).

f) HPCS diesel generator successfully completes the consecutive start and load test.

g) HPCS diesel generator synchronization and load transfer operate properly. This includes proper operation when tripped from the surveillance test mode.

h) Electrical interlocks between the HPCS diesel generator and its associated 4.16 kV bus operate properly.

i) The HPCS diesel generator is capable of being stopped and started manually from local and remote locations.

j) The rate of fuel consumption is such that the 7 day fuel storage inventory requirement is met.

TABLE 1.8-2 (Continued)

| Regulatory Guide (Ref.; RRRC Category | Degree of Conformance | Reference |
|---|---|---|
| 1.108 - Revision 1 - 8/77; RRRC Cat. 2) | That "first-out" annunciation was not used. The basis for this is the use of individual trip alarms, which give the operator adequate information for correct actions. Additionally, Technical Specifications and preoperational testing shall provide for testing of the standby diesel generators (DIV. I and DIV. II) in accordance with applicable sections of this regulatory guide except for Position C2a3. The standby diesel generator units (DIV. I and DIV. II) shall demonstrate full load carrying capability for an interval of not less than 24 hours at a load equivalent to the continuous ratings of each standby diesel generator. The continuous rating of each standby diesel generator (7000KW) exceeds the maximum accident load (refer to Table 8.3.1). This continuous rating also exceeds the maximum load required for forced shutdown (refer to Table 8.3-1). Since the continuous ratings of the standby diesel generators exceed either the maximum accident load or the load required for forced shutdown. Testing at PNPP continuous ratings is an adequate demonstration of the standby diesel generators capabilities. | |

640.59 (640.21) (14.2.12) The Class 1E 125 Volt D-C System Preoperational Test (FSAR Subsection 14.2.12.1.30) should demonstrate that loads necessary for safe shutdown can be started and operated at the minimum battery voltage.

Response

The Perry Project is in the process of completing a Class 1E Voltage Drop Evaluation (Calculation Program). This program includes evaluation of both 125 VDC control and power circuits. The calculation for D.C. powered devices/equipment utilizes a battery voltage consistent with when the equipment is required to operate. A value of 113 VDC will be used for equipment/devices actuated in the interval between loss of AC power and diesel-generator breaker closure. A battery discharge voltage existing at the time of equipment/device operation will be used for the remaining time. Devices or equipment calculated to have voltage less than their minimum rating will be tested to verify operation or physical changes will be made to increase the voltage at the devices or equipment.

When the evaluation is complete, Subsection 14.2.12.1.30 will be revised as necessary.

640.60 (640.24) (14.2.12) The Nuclear Boiler System Preoperational Test (FSAR Subsection 14.2.12.1.1) should verify that ADS valve accumulators and check valves perform as described in FSAR Subsection 5.2.2.4.1.

Response

The performance of the ADS valve accumulators and check valves as described in FSAR Subsection 5.2.2.4.1 will be verified.

Preoperational test abstract 14.2.12.1.1 has been revised to include verification that each ADS accumulator has sufficient capacity to provide 5 actuations of the associated ADS valve against atmospheric pressure, which is equivalent to demonstrate the design capacity of the accumulator to provide 2 actuations at 70 percent of maximum drywell design pressure. Section 14.2.12.1.48 (Safety Related Instrument Air Test) has been revised to determine that the receiver capacity is sufficient to maintain the ADS accumulators charged for seven days.

b. Prerequisities

1. Individual component tests are complete and have been approved.

2. Instrument calibration is complete.

3. Instrument air is available.

4. Electrical power is available.

5. Reactor vessel is available to receive water if actual level is to be checked.

6. The reactor coolant system pressure is at atmospheric for the ADS valve actuations.

c. Test Procedure

1. Water level instrumentation and system operation will be tested using simulated signals and by variations in actual vessel level.

2. Pressure instrumentation will be checked and system operations verified using simulated signals.

3. Main steam isolation valves will be tested for proper operation. Accumulator capacity will be checked. MSIV closure times will be measured including delays of initiation logic.

4. Main steam relief valves will be tested for proper operation.

5. Nuclear steam supply shutoff system operation will be verified, including containment isolation initiation logic for the following signals; RPV Low Level, High Drywell Pressure, MSL Space High Temperature, MSL High Radiation, MSL High Flow, MSL Low Pressure, Reactor Building Vent Exhaust High Radiation, and manual actuation.

6. Automatic depressurization logic functions will be verified.

7. Each ADS valve will be actuated five (5) times with the associated accumulator charging air isolated.

2. Nuclear steam supply shutoff system performs within design specification, including initiation of containment isolation for the following signals; RPV Low Level, High Drywell Pressure, MSL Space High Temperature, MSL High Radiation, MSL High Flow, MSL Low Pressure, Reactor Building Vent Exhaust High Radiation, and manual actuation.

3. Automatic depressurization logic performs within specification.

4. Main steam isolation valves perform within specification. MSIV valve operating times including delays of initiating logic are within limits of design specifications.

5. Main steam relief valves perform within specification.

6. RPV instrumentation performs in accordance with design specifications.

7. Each ADS accumulator is capable of opening the associated ADS valve five (5) times with the drywell at atmospheric pressure and with the accumulator charging air isolated.

14.2.12.1.2 Reactor Recirculation System Preoperational Test

a. Test Objective

1. To verify proper flow path is established with the recirculation loops.

2. To verify proper operation of system equipment such as Flow Control Valves, pump suction and discharge valves, sensors, alarms and interlocks.

3. To verify the low speed motor generator sets operate within design specifications.

4. To verify proper jet pump performance.

5. To verify proper operation of the Recirculation Flow Control System. Subsequent operation of the system during the Startup Test Phase will demonstrate that the system will control flow at operating conditions up to and including rated volumetric flow.

640.61 (640.41) (14.2.12) The Safety-Related Instrument Air Test (FSAR Subsection 14.2.12.1.48) should include or reference loss-of-air tests similar to those described in the Non-Safety Related Instrument Air System Loss of Instrument Air Acceptance Test (FSAR Subsection 14.2.12.3.15.2). Note that Regulatory Guide 1.68.3, Preoperational Testing of Instrument and Control Air Systems, can be used in lieu of Regulatory Guide 1.80.

Response

Section 14.2.12.1.48 has been revised to describe loss-of-air tests similar to those described in Section 14.2.12.3.15.2.

14.2.12.1.48 Safety Related Instrument Air

a. Test Objective

To verify the ability of the Safety Related Instrument air system to perform within design specifications

b. Prerequisites

1. Individual component tests are complete.

2. Instrument calibration is complete.

3. Electrical power is available.

c. Test Procedure

1. The air compressor package will be verified capable of providing compressed air to pressurize the Safety Related Instrument Air system.

2. The controls and operation of the system will be verified.

3. The loss of instrument air, by simulating both pipe break and moisture freezing will be tested.

d. Acceptance Criteria

1. The air compressor is capable of pressurizing the receiver tank to design pressure within the designed time limit.

2. System pressure capability is within design specification.

3. The in-line receivers are capable of maintaining the ADS accumulators properly charged for the required time period.

4. System capabiltiy is maintained for both sudden and slow loss of air pressure.

640.62
(640.51)
(1.8)
(14.2.12)

Modify the Shutdown from Outside the Control Room Test (FSAR Subsection 14.2.12.2.25) to include test initiation with the turbine generator in operation and plant systems in normal configuration (automatic controls in operation), or modify your exception to position C.3 of Regulatory Guide 1.68.2, as stated in FSAR Table 1.8-1, to provide expanded technical justification (explain how this test might result in damage to plant equipment) for not performing this test in accordance with Regulatory Guide 1.68.2.

Response

The Shutdown from Outside the Control Room Test (FSAR Subsection 14.2.12.2.25) has been modified to include test initiation with the Turbine Generator in operation and Plant Systems in normal configuration for the power level at which the test will be performed (approximately 10-25% power).

The Exception to position C.3 of Regulatory Guide 1.68.2 in FSAR Table 1.8-1 (attached) has been deleted.

TABLE 1.8-1 (Continued)

| Regulatory Guide (Rev.;RRRC Category) | Degree of Conformance | Reference |
|---|---|---|
| 1.68.1 - (Revision 1 - 1/77;RRRC Cat. 1) | | |
| Preoperational and initial startup testing of feedwater and condensate systems for boiling water reactor power plants | PNPP conforms to this guide with the exception to commitments of Position C.1 - "Preoperational Testing", since both the condensate and feedwater systems are classified as nonsafety for testability purposes. | 14.0 |
| 1.68.2 - (Revision 1 - 7/78;RRRC Cat. 1) | | |
| Initial startup test program to demonstrate remote shutdown capability for water-cooled nuclear power plants | PNPP conforms to this guide. | 14.0 |
| 1.69 - (Revision 0 - 12/73;RRRC Cat. 1) | | |
| Concrete radiation shields for nuclear power plants | PNPP conforms to this guide. | 12.0 |
| 1.70 - (Revision 3 - 11/78;RRRC Cat. 1) | | |
| Standard format and content of safety analysis reports for nuclear power plants | PNPP FSAR conforms to this guide. | FSAR |

640.63 (650.56) The Turbine Trip and Generator Load Rejection Test (FSAR Subsection 14.2.12.2.24) should be initiated by opening the main breaker such that the T-G will be subjected to the maximum overspeed condition, or modify FSAR Table 1.8-1 to provide technical justification for exception to Regulatory Guide 1.68, Appendix A.5.n.n.

Response

The method described in the Turbine Trip and Generator Load Rejection Test (FSAR Subsection 14.2.12.2.24) has been revised to state the generator load rejection will be initiated by opening the generator output breakers. This method will subject the turbine generator to maximum overspeed conditions by removing all load from the generator during full power operation. This revision is reflected in Amendment 16 to the FSAR (attached).

14.2.12.2.24 Test Number 27 - Turbine Trip and Generator Load Rejection

a. Test Objective

The purpose of this test is to demonstrate the response of the reactor and its control systems to protective trips in the turbine and generator.

b. Prerequisites and Initial Conditions

The HPCS and RCIC systems are operable. ERIS is available. The Steam Bypass and Pressure Control System is in the NORM mode of operation. The preoperational tests have been completed as applicable.

c. Test Instruction

Turbine trip (closure of the main turbine stop valves within ~0.1 second) and generator load rejection (closure of the main turbine control valves in about 0.1 to 0.2 second) will be performed at selected power levels during the Startup Test Program. At low power levels (<40 percent), reactor protection is provided by high neutron flux and high vessel pressure scrams. At higher power levels (>40 percent), the reactor will scram by sensing loss of stop and control valve hydraulic fluid pressure in anticipation of valve closure. Backup scram action is provided by high neutron flux and high vessel pressure.

A generator load rejection will be performed at low power level, such that nuclear boiler steam generation is within bypass value capacity, to demonstrate scram avoidance. At an intermediate power level, in excess of bypass capacity, a manual turbine trip will be performed, and the response of the plant to this trip and scram will be determined. A generator load rejection will also be performed at near 100% power.

Generator load rejections shall be initiated by opening the generator output breakers. The resultant automatic plant actions (e.g., turbine control valve fast closure, recirculation pump trip, reactor trip) will be analyzed for proper response.

640.56

640.64 (640.57) (14.2.12) Our review of the initial 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 adequately demonstrated by the initial test program. Expand FSAR Subsection 14.2.12 (Individual Test Descriptions) to address the following items:

Preoperational Testing

| R.G. 1.68 Appendix A | FSAR Section | Description |
|---|---|---|
| 1.e.10<br>1.j.17 | 10.4.7.2 | Feedwater heaters and drains and associated temperature, level and bypass control systems |
| 1.e.11 | 10.4.6.5 | Condensate cleanup system |
| 1.e.12 | 10.4.2.5 | Main condenser evacuation system |
| 1.j.25 | 7.7.1.8 | Process computer |
| 1.1.8 | 9..3.2.4 | Process sampling system |
| 1.m.1<br>1.m.3 | 9.1.3 | Siphon breakers on fuel pool lines and operability and leak tests of sectionalizing devices and drains and leak tests of gaskets or bellows in the refueling canal and fuel storage pool |
| 1.n.18 | 9.2.6.2 | Freeze protection heater on condensate storage tank recirculation line |

Startup Testing

| | | |
|---|---|---|
| 5.n | 4.4.6.1.4 | Loose parts monitoring |
| 5.f.f. | 9.4.3.2.2 | Steam tunnel cooling system |

Response

| | |
|---|---|
| 1.e.10<br>1.j.17 | The feedwater heater drain regulator valves and high level bypass valves are all tested during IC&R testing with the exception that the Hot Surge Tank of the Direct Contact Heater (1N21-B004) is tested in the Condensate System Test (N21). |
| 1.e.11 | Section 14.2.12.3 (attached) has been revised to include additional abstracts for the Condensate Filtration System and the Condensate Demineralization System |
| 1.e.12 | Section 14.2.12.3 (attached) has been revised to include an abstract for the Condenser Air Removal System |
| 1.j.25 | Section 14.2.12.3 (attached) has been revised to include an abstract for the Process Computer |
| 1.1.8 | Section 14.2.12.3 (attached) has been revised to include an abstract for the Process Sampling System |
| 1.m.1 | Sections 14.2.12.1.13 and 14.2.12.1.21 (attached) have been revised to include siphon breakers for the fuel pool. |
| 1.m.3 | Section 14.2.12.1.21 has been revised to include leak testing of the fuel pool and refueling canal gates |
| 1.n.18 | This is a tube and shell heat exchanger and was acceptance tested as part of the Building Heat System (P55). |
| 5.m | The test abstract for Loose Parts Monitoring System (FSAR Section 14.2.12.2.57)(attached) was added in Amendment 16 to the FSAR. |
| 5.f.f | In addition to preoperational testing, further testing is to be conducted during the startup test program as described in FSAR Section 14.2.12.2.36 (attached). This startup test abstract for Integrated HVAC testing was added in Amendment 16 to the FSAR. |

N23 Condensate Filtration System

a. Test Objective

1. To demonstrate the ability of the condensate filtration system to maintain condensate feedwater chemistry and proper operation of system controls.

2. The condensate system is operable and lined up to recirculate water to the hotwell.

3. Instrument and service air is available.

4. Electrical power is available.

5. Condensate storage and transfer is available with enough water to support this test.

6. Backwash receiving tank is available.

7. The process sampling system is available.

c. Test Procedure

1. The filter units are placed in operation and their controls are operated.

2. Effluent water purity is determined.

3. System flow rates are measured for each filter unit.

d. Acceptance Criteria

1. Each filter unit produces effluent water of the proper quality.

2. The condensate filtration bypass valve operates properly, based on flow during test conditions, to maintain specified differential pressure.

3. The On-line, Hold, and Backwash process operates properly for each filter unit.

4. System controls, interlocks, and alarms operate properly.

(N24) Condensate Demineralizer System

a. Test Objective

1. To demonstrate the ability of the condensate demineralizer system to maintain condensate feedwater chemistry and the operability of the regeneration system.

b. Prerequisites

1. Instrumentation and controls are calibrated and operable.

2. The condensate system is operable and lined up to recirculate water to the hotwell.

3. Instrument and service air is available.

4. Electrical power is available.

5. Condensate storage and transfer is available with enough water to support this test.

6. Backwash rinse and regeneration receiving tanks are available.

7. The process sampling system is available.

c. Test Procedure

1. The demineralizers are placed in operation and their controls are operated.

2. Effluent water purity is determined.

3. System flow rates are measured for each demineralizer and regeneration flow paths are exercised.

4. At least one demineralizer regeneration is performed.

d. Acceptance Criteria

1. Each demineralizer produces effluent water of the proper quality.

2. The condensate demineralizer bypass valve operates properly based on flow during test condition, to maintain specified differential pressure.

3. The In-Service, Standby, Resin Transfer and Resin Regeneration Modes associated with the system operate properly.

4. The system pneumatic valves operate properly.

5. System controls and interlocks operate properly.

N62 Condenser Air Removal

a. Objectives

1. To demonstrate the operability of the condenser air removal system.

b. Prerequisites

1. The condensate system is operable and lined up to recirculate water to the condenser.

2. The auxiliary boilers are operable and lined up to supply sealing steam.

3. The main and auxiliary condenser are available.

4. Instruments and controls are calibrated and operated.

5. Instrument air is available.

6. Electrical power is available.

7. The Off-Gas System and the Off-Gas Building Exhaust System is available.

8. The Turbine Building Closed Cooling Water System is available.

c. Test Procedure

1. The mechanical vacuum pumps are operated to establish an initial vacuum.

2. The mechanical vacuum pumps interlocks are functionally tested.

3. Various performance parameters are measured.

4. The condenser vacuum breakers are operated.

5. Simulated high radiation signals will be used to initiate isolation.

6. The steam jet air ejectors (SJAE) intercondenser level control valves are functionally tested.

d. Acceptance Criteria

1. The SJAE intercondenser level control valves maintain proper water level in the SJAI's intercondenser loop seals.

2. The system controls, interlocks and alarms operate properly.

3. The condenser vacuum pumps trip and the suction valves close on simulated high mainsteam line radiation.

C91 Process Computer

a. Test Objective

To demonstrate the proper operation of computer input/output logic and operator displays.

b. Prerequisites

1. Individual component tests are complete.

2. Computer system installed and operational.

3. Electrical power is available.

4. Computer software for input/output channels are operable to the extent necessary for performance of this test.

c. Test Procedures

1. Input signals are either simulated at the Input/Output cabinet or transmitted by installed instrumentation.

2. Output signals are either monitored at the Input/Output cabinet or by actuation of field devices.

d. Acceptance Criteria

1. The computer response correctly to input signals.

2. Computer outputs operate properly.

3. Operator displays are satisfactory.

N33/35 Process Sampling System

a. Test Objective

1. To demonstrate the process sampling system provides adequate process samples to the various installed analytical monitoring equipment and grab sample stations.

b. Prerequisites

1. Instrumentation and controls are calibrated and operable.

2. Electrical power is available.

3. Applicable sample cooling water is available.

4. Applicable waste receiving is available.

5. Service air is available.

c. Test Procedure

1. Each sample station is operated as available.

2. Grab samples are drawn from all grab sample points as available.

3. System alarms are activated.

d. Acceptance Criteria

1. Sample lines are unobstructed and provide adequate sample flows.

2. Grab sample valves operate properly.

3. System alarms operate properly.

4. Sample pressures and temperatures are maintained within specified values. (Certain sample pressures, temperatures and flowrates are deferred until after fuel load such that more representative process samples are available).

Note: Chemical fumehoods are tested for proper flow during the applicable HVAC test.

14.2.12.1.13 Residual Heat Removal System (RHR) Preoperational Test

a. Test Objective

To verify the ability of the Residual Heat Removal System to perform within design specifications in all modes of operation.

b. Prerequisites

1. Individual component tests are complete.

2. Instrument calibration is complete.

3. Electrical power is available.

4. Demineralized water is available in the suppression pool, the spent fuel pool and the reactor vessel.

5. The reactor vessel is available to receive water.

c. Test Procedures

1. Logic and interlock tests will be performed for all modes of operation to verify proper operation. These tests will be performed with the pumps locked out and will include actuation from each possible source. All associated events will be monitored.

2. The residual heat removal pumps will be tested to verify their performance is within design specifications. Pump head flow characteristics and NPSH are checked for consistency with design specifications for the various modes of operation.

3. The system will be aligned and flow established for each of the following modes or functions:

   a) Low pressure coolant injection. A simulated automatic initiation signal will be used for this test.

   b) Suppression pool cooling.

   c) Shutdown cooling.

   d) Test mode.

   e) Augmented fuel pool cooling.

4. Flow through the containment spray nozzles will be verified by conducting an air-flow test using flow paths which meet or overlap the boundaries of the water-flow test paths to demonstrate that there is no blockage in the flow path.

5. Performance of the water leg pump will be verified to be within design specifications.

6. Flow out of all siphon breakers associated with the augmented fuel pool cooling mode will be observed.

d. Acceptance Criteria

1. Logic, interlock and alarm functions perform within design specifications.

2. RHR pumps perform within design specifications. The basis for the criteria is to assure that the pump meets the flow requirements of its ESF function as well as pump operability considerations including NPSH requirements.

3. Proper flow is established in all modes.

4. The water leg pump performs within design specifications.

5. All siphon breakers associated with the augmented fuel pool cooling mode are unobstructed.

14.2.12.1.21 (G41) Fuel Pool Cooling and Cleanup System (FPCC) Preoperational Test.

a. Test Objective

To verify the ability of the Fuel Pool Cooling and Cleanup System to perform within the design specifications, and to demonstrate the Fuel Pool Gates are operable with acceptable leakage rates.

b. Prerequisites

1. Individual component tests are complete.

2. Instrument calibration is complete.

3. Electrical power is available.

4. Condensate storage and transfer equipment is available.

5. Nuclear closed cooling system is available.

c. Test Procedure

1. Controls, annunciators, logic and interlocks will be tested for proper operation.

2. Fuel pool filter/demineralizer performance will be verified in the following modes:

   a) Precoat

   b) Backwash

   c) Standby recirculation

   d) Normal operation

3. Flow to the spent fuel pool will be established and system ability to maintain level will be verified.

4. The ability of the containment isolation valves to perform within design specification will be verified.

5. Fuel pool cooling and cleanup pump performance will be verified to be within design specification.

6. Flow out of the all FPCC siphon breakers will be observed.

7. The Fuel Pool Gates are subjected to full hydrostatic head and leakage is determined.

d. Acceptance Criteria

1. Controls, annunciators, logic and interlocks perform within design specification.

2. System pumps and valves perform within design specification.

3. All siphon breakers associated with the FPCC system are unobstructed.

4. Leakage past the fuel pool gates is within specified limits.

d. Acceptance Criteria

Acceptance Criteria for Level 2:

Conductivity, oxygen, pH and sodium instrumentation readouts agree with grap samples within the specified tolerances.

14.2.12.2.57 Test Number 133 - Loose Parts Monitoring System

a. Test Objective

To obtain a full range of baseline data for the Loose Parts Monitoring System (LPMS).

b. Prerequisites and Initial Conditions

The preoperation test has been completed. The LPMS is lined up for manual operation.

c. Test Instruction

During steady state operation at various power levels baseline data will be taken on all 12 channels of the Loose Parts Monitoring System. This will include a cassette recording, a waveform plot and a loose part printout for each power level. The system will be placed in the manual mode of operation and, using the appropriate operating procedure for guidance, the required data will be obtained.

d. Acceptance Criteria

Acceptance Criteria for Level 2:

Baseline data has been satisfactorily obtained at the specified power levels.

14.2.12.2.36 Test Number 100 - Integrated HVAC

a. Test Objective

To demonstrate the ability of ventilation systems to maintain specified Unit 1 and common area temperatures and relative humidity within specified limits during plant operation. Specific aspects of certain ventilation systems operation will also be demonstrated.

b. Prerequisites and Initial conditions

Applicable preoperational tests have been completed. Ventilation systems are lined-up and operating. Outside atmospheric conditions are stable. Required test equipment is available and calibrated. Any abnormal sources of plant heat, such as large steam packing leaks, have been identified and their effect on the test evaluated.

c. Test Instruction

First at a low power level, and then at a high power level, data will be recorded to demonstrate proper operation of plant ventilation systems.

d. Acceptance Criteria

Acceptance Criteria for Level 2:

Recorded data will be compared to GAI specified temperature and relative humidity limits.

14.2.12.2.37 Test Number 113 - Service Water System

a. Test Objective

The purpose of this test is to demonstrate that the service water system can provide a sufficient amount of cooling water to the heat loads it supplies.

640.65
(640.58)
(14.2.12)

The following startup test abstracts should be modified to clarify the noted items:

(1) The Control Rod Drive System Test )FSAR Subsection 14.2.12.2.5) Level 1 acceptance criteria should describe the allowable number of slow and inoperative CRDs.

(2) The RCIC System Test (FSAR Subsection 14.2.12.2.12) Level 1 acceptance criteria should clarify reference to Figure 4.2-7. If this reference should be Figure 14.2-7, then this figure should be reinstated.

(3) The Water Level Reference Leg Temperature Test (FSAR Subsection 14.2.12.2.13.1) appears to have omitted Level 2 acceptance criteria for the Shutdown Range and Fuel Range level instrument systems.

(4) The Recirculation System - Trip of Two Pumps (FSAR Subsection 14.2.12.2.27.2) acceptance criteria reference Figure 14.2-6, which no longer addresses the concerns of this test. Either reinstate the appropriate figure, or modify the test to delete reference to Figure 14.2-6 and further modify Figure 14.2-6 to reference the test abstract to which it refers.

Response

(1) The limitation on the number of slow CRDs has been added to 14.2.12.2.5. The limitation on the total number of slow and inoperative CRDs is a test acceptance criteria, and is covered in the Technical Specifications.

(2) Section 14.2.12.2.12 should reference Figure 14.2-7, which has been reinstated.

(3) The Water Level Reference Leg Temperature Test (FSAR 14.2.12.2.13.1) does not include an acceptance criteria for the Fuel Range because it is not practical to obtain the assumed calibration conditions (Post-accident conditions in the drywell and containment) for this range, as it is detrimental to equipment. The Water Level Reference Leg Temperature Test (FSAR 14.2.12.2.13.1) Level 2 acceptance criteria was revised in Amendment 16 to the FSAR (attached) to include all other ranges.

(4) The test acceptance criteria has been revised to delete reference to the figure in Section 14.2.12.2.27.2d in Amendment 16 (attached). Figure 14.2-6 was no longer applicable to any test abstract and was deleted.

| Action | Test Conditions: Reactor Pressure with Core Loaded psig ($kg/cm_2$) 0 | 600(42.2) | 800(56.2) | Rated |
|---|---|---|---|---|
| Position Indication | all | | | |
| Insert/Withdraw | | | | |
| a) Single CRD Continuous Modes | all | | | |
| b) Gang Groups Continuous Modes | all | | | |
| Coupling | all | | | |
| Friction | all | | | all |
| Cooling Water Flow Rates (Total) | | | | 1 |
| Individual CRD Scram | | 4* | 4* | all |
| Individual CRD Scram | | | | 4** |

NOTE: Single CRD scrams should be performed with charging valve closed.

*Refers to four CRDs selected for continuous monitoring based on slow normal accumulator pressure scram times as determined from pre-operational 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 limitations systems.

**Scram times of the four slowest CRDs will be determined at Test Conditions 2,3, and 6 before or during planned reactor scrams. (See Tests 25b, 27 and 28).

d. Acceptance Criteria

Acceptance Criteria for Level 1:

1. Each CRD must have a normal withdrawal speed of less than or equal to 3.6 inches per second, indicated by a full 12-foot stroke in greater than or equal to 40 seconds.

2. The scram insertion time of each control rod from the fully withdrawn position, based on de-energization of the scram pilot valve solenoids at time zero, shall not exceed the acceptance criteria provided in the General Electric Startup Test Specifications. This includes the limit that the total number of "slow" drives (per the General Electric Startup Test Specification) shall not exceed 7.

2. The RCIC turbine shall not trip or isolate on overspeed during auto or manual start tests.

If any Level 1 criteria are not met, the reactor will only be allowed to operate up to a restricted power level defined by Figure 14.2-7 until the problem is resolved.

Acceptance Criteria for Level 2:

1. The turbine gland seal system shall be capable of preventing steam leakage to the atmosphere.

2. The delta P switches for the RCIC steam supply line high-flow isolation trip shall be calibrated to actuate at the value specified in the plant Technical Specifications (about 300%).

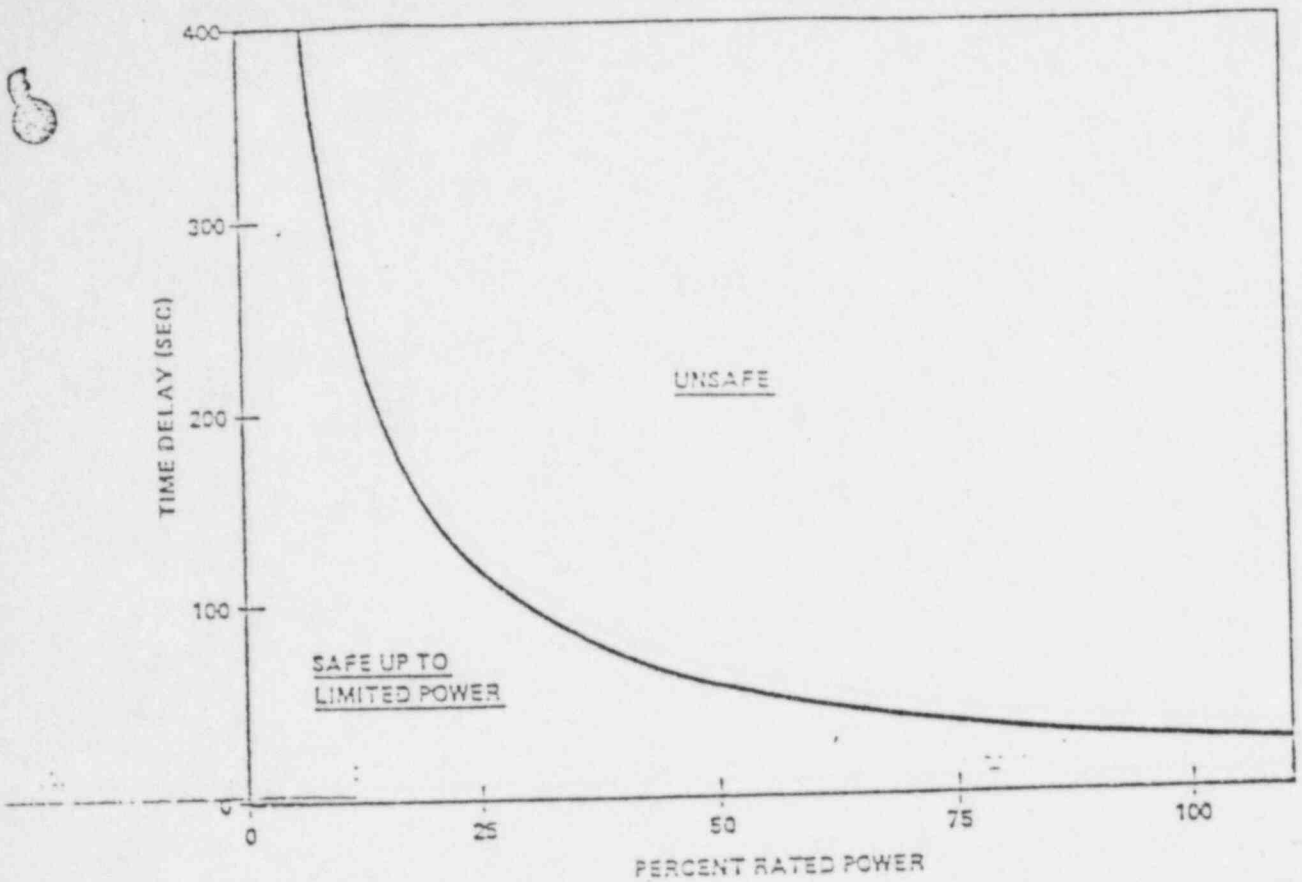
3. The speed and flow control loops shall be adjusted so that the decay ratio of any RCIC system related variable is not greater than 0.25.

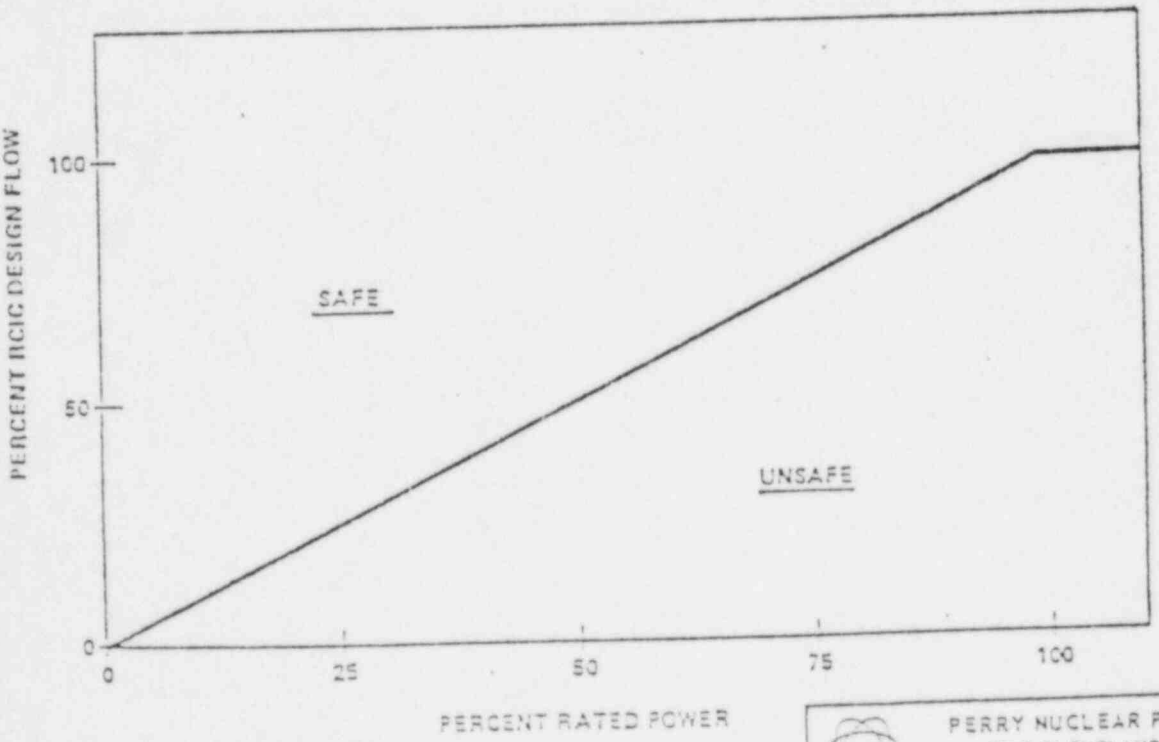
4. In order to provide an overspeed and isolation trip avoidance margin, the transient start first and subsequent speed peaks shall not exceed 5 percent above the rated RCIC turbine speed.

14.2.12.2.13 Test Number 16A - Selected Process Temperatures

a. Test Objective

The purpose of this test is to assure that the measured bottom head drain temperature corresponds to bottom head coolant temperature during normal operation, to identify any reactor operating modes that cause temperature stratification, to determine the minimum position of the flow control valves which will prevent coolant temperature stratification in the reactor pressure vessel bottom head region, and to familiarize plant personnel with the temperature differential limitations of the reactor system.




PERRY NUCLEAR POWER PLANT
THE CLEVELAND ELECTRIC
ILLUMINATING COMPANY

RCIC Acceptance Criteria Curves
For Capacity and Actuation Time

Figure 14.2-7

15

Am 3 (6-11-81)

2. The recirculation pump in an idle loop must not be started, active loop flow must not be raised, and power must not be increased unless the idle loop suction temperature is within $50^{o}$ F of the active loop suction temperature. If two pumps are idle, the loop suction temperature must be within $50^{o}$ F of the steam dome temperature before pump startup.

Acceptance Criteria for Level 2:

During two pump operation at rated core flow, the bottom head temperature as measured by the bottom head drain line thermocouple should be within $30^{o}$ F of the recirculation loop temperatures.

14.2.12.2.13.1 Test Number 16B - Water Level Reference Leg Temperature

a. Test Objective

The purpose of this test is to measure the reference leg temperature at rated temperature and pressure and steady-state, and ensure recalibration of the instruments if the measured temperature is different than the value assumed during the initial calibration. Temperature data will also be taken during open vessel testing to verify acceptance criteria for the Shutdown Range water level instrumentation. The Fuel Range reference leg temperatures will not be verified since this range is calibrated for post-accident conditions.

b. Prerequisites and Initial Conditions

Containment and drywell cooling systems are in normal operation and the temperature in the vicinity of the reference legs is steady-state. The preoperational tests have been completed as applicable and system instrumentation has been calibrated.

c. Test Procedure

To monitor the reactor vessel water level, five level instrument systems are provided. These are:

1. Shutdown Range

2. Narrow Range

3. Wide Range

4. Fuel Range

5. Upset Range

These systems are used respectively as follows:

1. Water level measurement in cold, shutdown conditions.

2. Feedwater flow and water level control functions.

3. Safety functions.

4. Post accident indication.

5. Level indication during transients.

The test will be done at rated temperature and pressure and under steady-state conditions and will verify that the reference leg temperature of the instrument is the value assumed during initial calibration. The atmosphere in the vicinity of the reference legs will be measured. This will be considered to be the temperature of the reference legs. Data taken during open vessel testing will be used to verify the acceptance criteria for the Shutdown Range level instrumentation.

d. Acceptance Criteria

Acceptance Criteria for Level 2:

The difference between the actual reference leg temperatures(s) and the value(s) assumed during initial calibration shall be less than that amount which will result in a scale end point error of 1 percent of the instrument span for each range.

2. The simulated heat flux margin to avoid a scram shall be $\geq$ 5.0 percent during the one pump trip for recovery.

3. The APRM margin to avoid a scram shall be $\geq$7.5 percent during the one pump trip recovery.

4. The time from zero pump speed to full pump speed shall be greater than 3 seconds.

14.2.12.2.27.2 Test Number 30B - RPT Trip of Two Pumps

a. Test Objective

The purpose of this test is to record and verify acceptable performance of the recirculation two-pump trip circuitry and to demonstrate satisfactory recirculation loop flow coastdown.

b. Prerequisites and Initial Conditions

Core flow is $\geq$95 percent NBR. ERIS is available to monitor the LPRM channels near the limiting fuel bundles. The preoperational tests have been completed.

c. Test Instruction

With the reactor operating between 55 percent and 65 percent core power, a turbine control valve fast closure will be simulated. The recirculation pumps will automatically transfer from the 60 Hz power supply to the low frequency motor generator supply. The transient will be recorded, analyzed, and compared to the acceptance criteria.

d. Acceptance Criteria

Acceptance Criteria for Level 1:

The two pump drive flow coastdown transient during the first 3 seconds must be bounded by the limiting curves provided by GE in the test specification.

640.66 (640.59) (1.8) (14.2.12) The Full Reactor Isolation Test (FSAR Subsection 14.2.12.2.22.2) and FSAR Table 14.2-2 should commit to conducting the simultaneous full closure of all MSIVs at Test Condition 6 (95% power), or technical justification should be provided in FSAR Table 1.8-1 for exception to Regulatory Guide 1.68, Appendix A.5.m.m.

Response

The Full Reactor Isolation Test will be performed at Test Condition 6 (95% power), as indicated in FSAR Table 14.2-2 and FSAR Subsection 14.2.12.2.22.2. Additionally FSAR Subsection 14.2.12.2.22.2c describes the full isolation as the simultaneous full closure of all MSIVs. This meets Regulatory Guide 1.68, Appendix A.5.m.m.

640.67 (640.60) (14.2.12) The System Preoperational Vibration Test (FSAR Subsection 14.2.12.4.1) should be modified to delete the note after Test Objective 4. It is not appropriate for the engineer to determine what portions of the test may be waived. Any test deviations should be processed through normal review and approval channels.

Response

The System Preoperation Vibration Test (FSAR Subsection 14.2.12.4.1) has been removed to Startup Test 122, (FSAR Subsection 14.2.12.2.46). This abstract has been modified to delete the note after Test Objective 4.

640.68
(640.61)
(14.2.12)

The following preoperational and acceptance test abstracts should be modified to clarify the noted items:

(1) The reference to drywell leakage testing in FSAR Subsection 14.2.12.1 should reference item 640.30, not 640.31.

(2) The Condensate System Acceptance Test (FSAR Subsection 14.2.12.3.8) should reference item 640.17, not 640.43.

(3) The Containment Vessel Chilled Water System Test (FSAR Subsection 14.2.12.3.14) should reference item 640.44, not 640.14.

(4) The acceptance test abstracts contained in the Q&R Section 14.2 should be deleted as they have been revised and incorporated into FSAR Subsection 14.2.12 as preoperational or acceptance test abstracts.

Response

(1) The reference to drywell leakage testing in FSAR Subsection 14.2.12.1 has been corrected to reference Item 640.30, (attached).

(2) The Condensate System Acceptance Test (FSAR Subsection 14.2.12.3.8) has been corrected to reference item 640.17, (attached).

(3) The Containment Vessel Chilled Water System Test (FSAR Subsection 14.2.12.3.14) has been corrected to reference Item 640.44, (attached).

(4) The acceptance test abstracts contained in the Q&R Section 14.2 have been deleted.

| Master Parts List (MPL) | System Name | Section |
|---|---|---|
| P41 | Cooling Tower Makeup Isolation | 14.2.12.1.56 |
| P49 | Emergency Service Water Screen Wash System | .57 |
| C51 | Solid Radwaste Disposal System | .58 |
| C22 | Redundant Reactivity Control System | .59 |
| D19 | Post Accident Radiation Monitoring System | .60 |
| N27B | Feedwater Leakage Control System | .61 |
| P53 | Penetration Pressurization System | .62 |
| P87 | Post Accident Sampling System | .63 |
| R14A | ATWS Class 1E Uninterruptible Power Supply | .64 |
| R71 | Emergency and Essential Lighting System | .65 |

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The Drywell Leakage Test is described in Section 6.2.6.5.1.

14.2.12.1.1 Nuclear Boiler System Preoperational Test

a. Test Objective

To verify the ability of the Nuclear Boiler System to perform within design specification.

(b) Proper system controls, indications and alarms are verified to function correctly.

(c) Fan auto-trip and auto-start signals function correctly.

(d) Space humidification is maintained at acceptable level.

d. Acceptance Criteria

1. System fans perform satisfactory and delivered specified air quantities.

2. System instrument controls function per design requirements.

3. System interlocks function as required and designed.

640.43

14.2.12.3.8 Condensate System Acceptance Test (N21)

a. Test Objective

1. To demonstrate that the condensate system pumps are capable of supplying the designed flow of condensate at designed head.

2. To demonstrate that the condensate system is capable of maintaining the condenser hotwell within normal operating units.

3. To operationally verify the interlocks and alarms associated with the hot surge tank.

4. To demonstrate that the NPSH available exceeds NPSH required for the condensate system pumps.

640.17

b. Prerequisites

1. Individual component tests have been completed.

2. Instrument calibration is complete.

3. Electrical power is available.

4. Demineralized water is available.

5. Instrument air is available.

6. The turbine building closed cooling, condensate transfer and storage and feedwater systems are available.

c. Test Procedure

1. The hotwell pumps and the condensate booster pumps will be operated to verify that each pump supplies design flow at design head.

2. The hotwell level control functions will be verified by varying the hotwell level.

3. The hot surge tank level instrumentation will be verified relative to alarms and associated interlocks by varying the hot surge tank level.

4. The condensate system will be operated at full flow and pump suction pressures will be corrected for the worst case condition relative to verification of NPSH available.

d. Acceptance Criteria

1. The hotwell level control system maintained the level in the hotwell within normal operating limits.

2. The interlocks and alarms associated with the hot surge tank actuated at the design values.

17.049

14.2.12.3.14 Containment Vessel Chilled Water System (P50)

a. Test Objective

To verify the ability of the Containment Vessel Chilled Water System to perform within design specifications.

b. Prerequisites

1. Indiviudal component testing has been completed.

2. Instrument calibration and loop checks are completed.

3. Test instrumentation is available and is calibrated.

4. Instrument air is available.

5. Electrical power is available.

6. Nuclear closed cooling water system is available.

7. Containment vessel cooling ventilation system is available.

8. In service inspection room ventilation system is available.

c. Test Procedure

1. Proper operation of the Containment Vessel Chilled Water System is verified as follows:

(a) Chilled water pump capacities are verified for design gpm.

(b) Containment isolation valves function correctly and operate within prescribed time.

44.049

(c) System responds correctly to manual isolation signal.

(d) System responds correctly to automatic isolation signal.

(e) Proper system controls, indications and alarms are verified to function correctly.

d. Acceptance Criteria

1. System pumps perform satisfactorily and deliver specified water flows.

2. System instruments control function per design requirements.

14.2.12.3.15 Non-Safety Related Instrument Air and Loss of Instrument Air Acceptance Tests

14.2.12.3.15.1 Non-Safety Related Instrument Air Acceptance Test

a. Test Objectives

1. Verify the instrument air (IA) system is capable of supplying air at the required flow, pressure, temperature and dew point.

2. Verify proper operation and control for the manual and automatic modes of operation of the IA compressor.

3. Verify proper operation of redundant components.

b. Prerequisites

1. Instrument calibration complete.

2. Electric power available.

3. Required support systems are available.

## FSAR PREOPERATIONAL TEST PROGRAM REFERENCES

| MPL | SYSTEM | FSAR REF. |
|---|---|---|
| B13 | Reactor System (Internals) | 14.2.12.1.33 |
| B21 | Nuclear Boiler | 14.2.12.1.1 |
| B33 | Reactor Recirculation | 14.2.12.1.2 |
| C11 | Control Rod Drive Hydraulic | 14.2.12.1.3 |
| | Rod Control & Information | 14.2.12.1.50 |
| C22 | Redundant Reactivity Control | 14.2.12.1.59 |
| C34 | Feedwater Control | 14.2.12.1.4 |
| C41 | Standby Liquid Control | 14.2.12.1.5 |
| C51 | Neutron Monitoring | 14.2.12.1.6,& 14.2.12.1.7 |
| | (SRM, IRM, LPRM, APRM & TIP) | |
| C61 | Remote Reactor Shutdown | 14.2.12.1.8 |
| | Division 2 Remote Shutdown | Note 1, 2 |
| C71 | Reactor Protection | 14.2.12.1.9 |
| D17 | Plant Radiation Monitoring System | 14.2.12.1.10 |
| D19 | Post Accident Radiation Monitoring | 14.2.12.1.60 |
| D21 | Area Radiation Monitoring System | 14.2.12.1.11 |
| D23 | Containment Atmosphere Monitoring | 14.2.12.1.12 |
| E12 | Residual Heat Removal | 14.2.12.1.13 |
| E15 | Containment Spray | 14.2.12.1.13.c.4 |
| E21 | Low Pressure Core Spray | 14.2.12.1.14 |
| E22 | High Pressure Core Spray | 14.2.12.1.15 |
| E31 | Leak Detection | 14.2.12.1.16 |
| E32 | MSIV Leakage Control | 14.2.12.1.17 |

| | | |
|---|---|---|
| E51 | Reactor Core Isolation Cooling | 14.2.12.1.18 & 6.2.6.3 |
| E53 | Containment Isolation | 14.2.12.1.1.c.5 and 6.2.6.3 |
| E61 | Integrated Leak Rate Test | 14.2.12.1 |
| | Local Leak Rate Test | 6.2.6.2 |
| | Containment Structural Integrity Test | 14.2.12.1 |
| E62 | Drywell Leak Test | 14.2.12.1 |
| E64 | Shield Building Leak Rate Test | 14.2.12.1.43 |
| E66 | Drywell Structure Integrity Test | 14.2.12.1.44 |
| E67 | Control Room Leakage | 14.2.12.1.25 |
| F11 | Fuel Servicing Equipment | 14.2.12.1.45 |
| F12 | Servicing Aids | 14.2.12.1.45 |
| F13 | Reactor Vessel Servicing Equipment | 14.2.12.1.45 |
| F14 | In-Vessel Servicing Equipment | 14.2.12.1.45 |
| F15 | Refueling Equipment | 14.2.12.1.45 |
| F16 | Storage Equipment | 14.2.12.1.45 |
| F17 | Under Reactor Vessel Servicing Equipment | 14.2.12.1.45 |
| F42 | Fuel Transfer Equipment | 14.2.12.1.19 |
| G33 | Reactor Water Cleanup | 14.2.12.1.20 |
| G36 | RWCU Filter/Demineralizers | 14.2.12.1.20 |
| G41 | Fuel Pool Cool and Cleanup | 14.2.12.1.21 |
| G43 | Suppression Pool Makeup | 14.2.12.1.22 |
| G50 | Liquid Radwaste System | 14.2.12.1.23 |
| G51 | Solid Radwaste Disposal System | 14.2.12.1.58 |
| L51 | Reactor Building Polar Crane | 14.2.12.1.51 |
| | and Fuel Handling Area Crane | 14.2.12.1.52 |
| M11 | Containment Vessel Cooling System | 14.2.12.1.54 |
| M13 | Drywell Cooling System | 14.2.12.1.55 |

| | | |
|---|---|---|
| M15 | Annulus Exhaust Gas Treatment | 14.2.12.1.24 |
| M16 | Drywell Vacuum Relief | 14.2.12.1.46 |
| M17 | Containment Vacuum Relief | 14.2.12.1.47 |
| M23 | MCC Switchgear & Misc. Area HVAC | 14.2.12.1.35 |
| M24 | Battery Room Exhaust | 14.2.12.1.35 |
| M25 | Control Room HVAC | 14.2.12.1.25 |
| M26 | Control Room Emergency Recirculation | 14.2.12.1.25 |
| M28 | Emergency Pump Area Cooling | 14.2.12.1.36 |
| M32 | Emergency Service Water Pump House Ventilation | 14.2.12.1.37 |
| M36 | Off-Gas Building Exhaust | 14.2.12.1.38 |
| M39 | ECCS Pump Room Cooling | 14.2.12.1.39 |
| M40 | Fuel Handling Area Ventilation | 14.2.12.1.40 |
| M43 | Diesel Generator Building Ventilation | 14.2.12.1.26 |
| M51 | Combustible Gas Control | 14.2.12.1.41 |
| M56 | Hydrogen Control | Note 1 |
| M98 | Engineered Safety Features Systems, | 6.5.1.4 & 9.4.2.4 |
| | In Place Filters | |
| N27B | Feedwater Leakage Control System | 14.2.12.1.61 |
| N64 | Offgas System | 14.2.12.1.27 |
| P41 | Service Water Cooling Tower Makeup Isolation Valves | 14.2.12.1.56 |
| P42 | Emergency Closed Cooling | 14.2.12.1.28 |
| P45 | Emergency Service Water | 14.2.12.1.29 |
| P47 | Control Complex Chilled Water | 14.2.12.1.42 |
| P49 | Emergency Service Water Screen Wash | 14.2.12.1.57 |
| P53 | Penetration Pressurization | 14.2.12.1.62 |
| | Personnel Airlock Leakage Control System | 6.2.6.2 |
| P57 | Safety-Related Instrument Air | 14.2.12.1.48 |
| P72 | Plant Underdrain System | 14.2.12.1.34 |

| | | |
|---|---|---|
| P87 | Post Accident Sampling | 14.2.12.1.63 |
| R14A | Class 1E Uninterruptible Power Supply (RRCS) | 14.2.12.1.64 |
| R22 | Metal Clad Switchgear | 14.2.12.1.49 |
| R23 | 480 Volt Load Centers | 14.2.12.1.49 |
| R24 | Motor Control Centers | 14.2.12.1.49 |
| R25 | Dist. Panels - 120, 240, & 480 V | 14.2.12.1.49 |
| R42 | Class 1E 125 Volt DC | 14.2.12.1.30 |
| R43 | Standby Diesel Generator | 14.2.12.1.31 |
| R44 | Standby Diesel Generator Starting Air | 14.2.12.1.31 |
| R45 | Standby Diesel Generator Fuel Oil | 14.2.12.1.31 |
| R46 | Standby Diesel Generator Jacket Water Cooling | 14.2.12.1.31 |
| R47 | Standby Diesel Generator Lube Oil | 14.2.12.1.31 |
| R48 | Standby Diesel Generator Exhaust/Intake/Crankcase | 14.2.12.1.31 |
| R71 | Emergency Lighting | 14.2.12.1.65 |
| R76 | ECCS Integrated Initiation with LOSP | 14.2.12.1.32 |

NOTES:
1. New or revised system as a result of changed regulatory requirements.
2. Test abstract will be added to FSAR Chapter 14 in Amendment 19.