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MIDDLE SOUTH UTILITIES SYSTEM

June 11, 1984

W3P84-1607
Q-3-A29.14

Director of Nuclear Reactor Regulation
Attention: Mr. G.W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: Waterford 3 SES
Docket No. 50-382
FSAR Chapter 14

REFERENCE: W3P84-1353 dated May 23, 1984

Dear Sir:

The purpose of this letter is to supplement the information submitted via Reference 1 and to provide a point-by-point discussion of all concerns that Mr. R. Beker had in Questions 640.17, 18, 19, 20, 21 and 22. Attached also are proposed FSAR changes which will be implemented in a future amendment in accordance with 10 CFR 50.71(e) requirements.

In addition, and as discussed with Mr. R. Beker, attached are the proposed changes to the acceptance criteria of the Chemistry test (14.2.12.3.16.4) and the test for the inverters (14.2.12.2.3) and the CPC power-distribution-related constants (14.2.12.3.28).

We understand that these clarifications are acceptable to the NRC.

Yours very truly,

K.W. Cook

K.W. Cook
Nuclear Support & Licensing Manager

KWC/PC/pco

Attachment

cc: E.L. Blake, W.M. Stevenson, J.T. Collins, D.M. Crutchfield,
J. Wilson, G.L. Constable, R. Beker, R. Gruel (BNWI)

B001
1/1

Question No.

640.17 (14.2.12) In response to Item 640.7, you provided information regarding certain preoperational tests which were to be completed after fuel loading. The response to this item should address the following preoperational tests (FSAR Subsection 14.2.12.2), or these tests should be modified to state that they will be completed prior to fuel loading: 9, 10, 14, 15, 25, 45, 52, 57, 58, 62, 66, 68, 69, 70, 71, 72, 73, and 75.

Response

The response to NRC Question 640.7 will be amended as attached to reflect preoperational tests 45, 66, 69, 70, 71, 72 and 75. The respective FSAR Subsections for the remaining tests will be amended as attached to indicate that they (tests 9, 10, 14, 15, 25, 52, 57, 58, 62, 68 and 73), will be completed prior to fuel load.

Question No.

640.7 Subsection 16.2.5 states that Phase I and II testing will not necessarily be completed prior to commencing Phase III testing. If portions of any preoperational tests are intended to be conducted, or their results approved, after fuel loading:

1. List each test;

2. State what portions of each test will be delayed until after fuel loading;

3. Provide technical justification for delaying these portions;

4. State when each test will be completed (key to test conditions defined in Chapter 14);

5. Document that completed portions of each test will be subject to conditional review and approval prior to fuel load.

Note that any test not begun prior to fuel loading should be included in Phase III instead of in Phase II Test descriptions.

Response

The following Phase II tests described in FSAR Subsection 14.2.12.2 abstracts are presently planned for completion after fuel loading:

1. Final testing of the Main Feedwater Pumps (Subsection 14.2.12.2.67.3.C) will be performed during power ascension tests at the various power plateaus. These tests will complete the pump performance verification (head, flow) which cannot be accomplished previously due to the inability to establish flows up to full design valves at rated head to either the steam generators or condenser. Also the pump turbine operation using extraction steam will be performed since extraction steam is not available previously.

2. Final verification of the MSR and FWH level controls will be accomplished at the 20 percent and 100 percent plateaus. This cannot be accomplished previously due to the lack of integrated operation of all necessary systems. (Steam, Feedwater, Condensate, Heater drains).

3. Demonstration of the proper gland seal performance (Subsection 14.2.12.2.76.3.B) will be accomplished at 50 percent power. This is necessary to ensure the high pressure turbine gland operates properly when the turbine is under pressure and supplies the steam to the gland. These conditions cannot be established prior to fuel load and loading of the generator.

4. The testing of the Movable Incore Detectors (Subsection 14.2.12.2.58.3) will be completed after fuel loading and prior to initial criticality since the final installation is not accomplished until the fuel is loaded.

INSERT →

The above tests are included in the comprehensive review of Phase II testing by JTG prior to fuel loading discussed in Subsection 14.2.5. The results of completed portions, as well as the impact of the outstanding portions will be evaluated. In addition, the outstanding portions fall into category (c) of incomplete Phase II tests, described in Subsection 14.2.5, and will be approved by PORC for later completion. If other Phase II Tests are later identified to be completed after fuel loading, due to added testing, equipment limitations or plant condition limitations, they will also be reviewed and approved in the same manner.

Reference

No FSAR changes were made.

INSERT

5. Also the following preoperational tests will be completed after fuel load in agreement with FSAR Subsection 14.2.12.2:

   (a) Waste Management System (14.2.12.2.45) - preoperational testing of the radioactive sump pumps will not be completed until 5% power.

   (b) Feedwater System (14.2.12.2.66) - preoperational flow testing will be completed during power ascension.

   (c) Main Steam System and Steam Generators (14.2.12.2.69) - preoperational testing will be completed prior to 5% power.

   (d) Steam Generator Blowdown (14.2.12.2.70) - preoperational testing will be completed prior to 5% power.

   (e) Extraction Steam System (14.2.12.2.71) - preoperational testing will be concluded during power ascension.

   (f) Heater Drains and Vents (14.2.12.2.72) - preoperational testing will be completed during power ascension.

   (g) Gland Seal System (14.2.12.2.75) - preoperational testing will be completed during power ascension.

Completion of the above items on the noted schedules does not degrade nuclear safety or require exceptions to the Technical Specifications. In fact, completion of tests (b)-(g) requires for the most part hot, post-fuel load conditions.

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14.2.12.2.9 AIRBORNE AND AREA RADIATION MONITORING SYSTEM* 29

14.2.12.2.9.1 Objective

To verify the functional performance of the Airborne and Area Radiation Monitoring System. 8

14.2.12.2.9.2 Prerequisites

A. Construction activities on the systems to be tested are complete. 18

B. Permanently installed instrumentation is operable and calibrated. 29

C. Test instrumentation is available and calibrated. 15

D. Calibration check source is available.

E. Closed Component Cooling Water (CCCW) System, plant stack, and Fuel Handling Building Ventilating System are available to establish flow rates. 18 15

F. Plant systems required to support testing are operable, or temporary systems are installed and operable. 29 15

14.2.12.2.9.3 Test Method

A. Verify the calibration and operation of each area radiation monitor. 8

B. Adjust the detector flow rate for plant stack and CCCW System detectors. 18 8

C. Verify the self-testing feature of each radiation detector. 15

D. Verify proper operation of all control logic, protective devices, controls, interlocks, and alarms. 18 15

14.2.12.2.9.4 Acceptance Criteria 8

The Airborne and Area Radiation Monitoring System performs as described in Subsection 12.3.4. 15

*Portions of this test will be completed after initial fuel load but prior to exceeding 5 percent power as follows: 29

Decontamination Room Airborne Monitor
Hot Machine Shop Airborne Monitor
Drumming Room Airborne Monitor

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14.2.12.2.10 PROCESS AND EFFLUENT RADIATION MONITORING SYSTEM* 29

14.2.12.2.10.1 Objective 15

To verify that the Process and Effluent Radiation Monitoring System can detect and record specific radiation levels, and to verify all alarms and interlocks.

14.2.12.2.10.2 Prerequisites 8

A. Construction activities on the systems to be tested are complete. 18

B. Permanently installed instrumentation is operable and calibrated. 29

C. Test instrumentation is available and calibrated. 15

D. Plant systems required to support testing are operable, or temporary systems are installed and operable.

E. Suitable calibrated source material is available.

14.2.12.2.10.3 Test Method 8

A. Verify proper operation of controls, alarms, plant computer inputs, and displays, using actual or simulated signals. 15

B. Calibrate radiation monitors using check source materials.

C. Demonstrate that the proper isolation signals for the Effluent Waste Management System are developed upon detection of high radiation levels. 8

14.2.12.2.10.4 Acceptance Criteria 18

The Process and Effluent Radiation Monitoring System performs as described in Section 11.5. 15

*Portions of this test will be completed after initial fuel load but prior to exceeding 5 percent power as follows:

1. Fuel Handling Emergency Exhaust Noble Gas Monitor 29
2. Letdown Monitor
3. Boric Acid Condensate Discharge Monitor
4. Waste Liquid Flow Control Monitor
5. Waste Gas Discharge Monitor
6. Blowdown Sump to Condenser Monitor
7. Interface Units for 2 to 6 above.

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14.2.12.2.14 CIRCULATING WATER SYSTEM* 15

14.2.12.2.14.1 Objective 8

To demonstrate the proper operation of the Circulating Water System. 15

14.2.12.2.14.2 Prerequisites 8

A. Construction activities on the systems to be tested are complete. 18

B. Permanently installed instrumentation is operable and calibrated.

C. Test instruments are available and calibrated. 29

D. Plant systems required to support testing are operable, or temporary systems are installed and operable.

E. Traveling screens are installed.

F. Intake structure is flooded.

14.2.12.2.14.3 Test Method 8

A. Verify control logic.

B. Verify the head and flow characteristics for the circulating water pumps. 15

C. Verify proper valve operation of the discharge valve, failure mode of vacuum breakers, stroking speed of discharge valve, and position indication. 8 15

D. Demonstrate proper operation of components such as motors, pumps, and air eductors in all operating modes and flow paths. 8

E. Verify proper operation of designated components, such as protective devices, controls, interlocks, instrumentation, computer inputs, and alarms, using actual and simulated inputs. 15

14.2.12.2.14.4 Acceptance Criteria 8

The Circulating Water System operates as described in Subsection 10.4.5.

* This test will be completed after initial fuel load but prior to exceeding 5 percent power. 29

14.2.12.2.15 TURBINE BUILDING CLOSED COOLING WATER SYSTEM* 29

14.2.12.2.15.1 Objective

To verify proper operation of the Turbine Building Closed Cooling Water System. 8

14.2.12.2.15.2 Prerequisites

A. Construction activities on the systems to be tested are complete. 18

B. Plant systems required to support testing are operable, or temporary systems are installed and operable. 15

C. Test instrumentation is available and calibrated. 8

D. Permanently installed instrumentation is operable and calibrated. 29

14.2.12.2.15.3 Test Method

A. Verify all control logic. 8

B. Verify the proper operation of the cooling pumps, including head and flow characteristics.

C. Demonstrate flow paths and verify heat exchanger temperature rise, inlet and outlet water temperatures, equipment temperature and monitor performance and make appropriate flow rate adjustments to satisfy performance parameters. 35

D. Demonstrate that the heat exchangers will operate at design flow rate without exceeding heat exchanger design pressure drop.

E. Verify the proper operation of the surge tank level control and upper and lower level alarms. 8

F. Verify the proper operation of all protective devices, controls, interlocks, instrumentation, and alarms.

G. Verify, if applicable, the proper operation, failure mode, stroking speed, and position indication of control valves. 15

14.2.12.2.15.4 Acceptance Criteria

The Turbine Building Closed Cooling Water System performs as described in Subsection 9.2.7. 8

* All portions of this test with the exception of section 14.2.12.2.15.3.C will be completed prior to initial fuel load with the remainder of the test performed at a power ascension. 35

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14.2.12.2.25 TURBINE BUILDING VENTILATING SYSTEM* 29

14.2.12.2.25.1 Objective 8

To demonstrate that the Turbine Building Ventilating System provides a suitable operating environment for equipment and personnel during normal operations. 29

14.2.12.2.25.2 Prerequisites 8

A. Construction activities on the systems to be tested are complete. 18

B. Test instrumentation is available and calibrated. 15

C. Plant systems required to support testing are operable, or temporary systems are installed and operable.

14.2.12.2.25.3 Test Method

A. Verify all control logic.

B. Verify the proper operation of all inlet air dampers and damper controls. 8

C. Verify the proper operation of the exhaust fan units and dampers.

D. Demonstrate the ability of the air handling units to provide proper air flow to the switchgear room.

E. Demonstrate that the proper operation of the condensate pump motor exhaust fan system provides adequate cooling air flow. 15 34

F. Verify the proper operation of all protective devices, controls, interlocks, instrumentation, and alarms. 8 15

14.2.12.2.25.4 Acceptance Criteria 8

The Turbine Building Ventilating System performs as described in Subsection 9.4.4.

*This test will be completed after fuel load but prior to exceeding 5% power 28

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14.2.12.2.52 FUEL HANDLING AND STORAGE SYSTEM 15

14.2.12.2.52.1 Objective 8

To verify the proper operation of the Fuel Handling and Storage System. 15

14.2.12.2.52.2 Prerequisites 8

A. Construction activities on the systems to be tested are complete. 18

B. Permanently installed instrumentation is operable and calibrated. 29

C. Plant systems required to support testing are operable, or temporary systems are installed and operable. 15

D. Test instrumentation is available and calibrated. 29

14.2.12.2.52.3 Special Prerequisites 8

A. The reactor vessel head and upper guide structure are removed. 29

B. The core support barrel is installed and aligned. 8

C. Dummy fuel assemblies, dummy CEAs, and test weights are available. 15

14.2.12.2.52.4 Test Method

A. Verify the proper operation of the new fuel elevator and the full load interlock disabling the elevator raise feature. 8

B. Verify the proper operation of the spent fuel handling bridge, checking bridge, trolley, and hoist speeds, load limits, interlocks, and limit switches. 15 8

C. Using the X-Y coordinates and the spent fuel handling machine, trial fit each of the spent fuel storage rack positions. 15

D. Verify the transfer system using both consoles and upenders to prove proper operation. 8

E. Verify the proper operation of the dual-masted refueling machine checking bridge, trolley, and hoist speed, limit switches, interlocks, and load limits. 15 8

F. Index the reactor core positions using the X-Y coordinates with the refueling machine.

G. Using a dummy fuel assembly, trial fit the Reactor Building storage racks and record coordinates. 34

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H. Prove operability of the dry sipping equipment, checking console 34
resistance temperature detector (RTD) responses and complete pneumatic 15
and blowdown cycle.* 34

I. Using the full sequence of focusing, camera tilt, and camera rotation, 34
verify the proper operation of the underwater TV camera system 8

J. Utilizing the complete Fuel Handling and Storage System, transfer a 34
dummy fuel assembly from the new fuel elevator through a total fuel 8
loading cycle in the reactor core and a total spent fuel cycle from
the core to the spent fuel storage area, both in automatic and manual
modes of operation. 15

K. Demonstrate the capabilities of the special fuel handling tools 34
through proper operation with dummy fuel assembly and dummy control
element assembly. 8

14.2.12.2.52.5 Acceptance Criteria

The Fuel Handling and Storage System performs as described in Section 9.1. 15

* This portion of the test need not be performed prior to initial fuel load, 34
but may be performed prior to initial use of dry sipping equipment.

14.2.12.2.57 **FIXED INCORE DETECTOR SYSTEM*** 29

14.2.12.2.57.1 Objective 8

To verify the proper operation of the Fixed Incore Detector (Neutron Flux) System. 15

14.2.12.2.57.2 Prerequisites 8

A. Construction activities on the systems to be tested are complete. 18

B. Permanently installed instrumentation is operable and calibrated. 29

C. Plant systems required to support testing are operable, or temporary systems are installed and operable. 15

D. Test instrumentation is available and calibrated. 29

14.2.12.2.57.3 Test Method 8

A. Using external test instrumentation, simulate incore detector signals into the signal (amplifier) circuits. 15

B. Vary the simulated inputs to the amplifier and record its outputs to the plant computer.

14.2.12.2.57.4 Acceptance Criteria 8

The Fixed Incore Detector System operates as described in Subsection 7.7.1.7. 15

*The electrical operability of the system will be tested prior to fuel load. However, the detector responsiveness and comparison testing will be done after fuel load. 34

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14.2.12.2.58 MOVABLE INCORE DETECTOR SYSTEM* 29

14.2.12.2.58.1 Objective 8

To verify the proper performance of the Movable Incore Detector System. 15

14.2.12.2.58.2 Prerequisites 8

A. Construction activities on the systems to be tested are complete. 18

B. Permanently installed instrumentation is operable and calibrated. 29

C. Plant systems required to support testing are operable, or temporary systems are installed and operable. 15

D. Test instrumentation is available and calibrated. 29

14.2.12.2.58.3 Test Method

A. Operate one set of drive and transfer machines at a time and record all pertinent outputs, including encoder signals. 8

B. Using external instrumentation, simulate the plant computer command signals to drive the detectors and to change inlet-to-outlet instrument loop alignments. Monitor all feedback signals as required for verification of simulated commands. 15

C. Operate the system from the main control room board and verify proper operation by monitoring the feedback signals. 8

D. Operate the system from the local position with the portable control set and verify proper operation by monitoring the feedback signals. 15

14.2.12.2.58.4 Acceptance Criteria 8

The Movable Incore Detector System performs as described in Subsection 7.7.1.7. 15

*The mechanical operability of the system will be tested prior to fuel load. However, the detector responsiveness and comparison testing will be done after fuel load. 34

14.2.12.2.62 REACTOR POWER CUTBACK SYSTEM* 34

14.2.12.2.62.1 Objective

To verify the ability of the reactor power cutback module (RPCM) and the reactor power cutback control panel (RPCCP) to provide outputs to initiate a step reduction in reactor power following an input for full load rejection or the loss of one main feedwater pump. 15 8 34

14.2.12.2.62.2 Prerequisites

A. Plant systems required to support testing are operable, or temporary systems are installed and operable. 15

B. Permanently installed instrumentation associated with the Reactor Power Cutback System operable and calibrated. 8 29

C. Test instrumentation is available and calibrated.

14.2.12.2.62.3 Test Method 8

A. Demonstrate proper operational interface between the reactor power cutback control panel and the reactor power cutback module. 15

B. Demonstrate the proper [illegible]mance of all lamps and alarms. 8

C. Verify outputs to the Control Element Drive Mechanism Control System, Plant Monitoring System, Turbine Control System, Main Feedwater Pumps, and Nuclear Steam Supply System (NSSS) Control System. 15

D. Demonstrate operation in both the auto and manual modes.

14.2.12.2.62.4 Acceptance Criteria 8

The Reactor Power Cutback System operates in accordance with Subsection 7.7.1.9. 15

*Portions of this test will be completed after fuel load. 34

14.2.12.2.68 CHEMICAL FEED SYSTEM*

14.2.12.2.68.1 Objective 34

To verify the ability of the Chemical Feed System to add chemicals to the secondary systems. 8

14.2.12.2.68.2 Prerequisites 34

A. Construction activities on the systems to be tested are complete. 18

B. Permanently installed instrumentation is operable and calibrated. 29

C. Plant systems required to support testing are operable, or temporary systems are installed and operable. 15

D. Test instrumentation is available and calibrated. 29

14.2.12.2.68.3 Test Method 34

A. Verify, if appropriate, proper operation, failure mode, stroking speed, and position indication of control valves. 15

B. Align the hydrazine and ammonia systems for normal operation and verify that each will supply the proper solution at controlled rate to the secondary systems. 8

C. Verify that the hydrazine solution pump can be controlled by the computer on signals received from the hydrazine residual analyzer. 9

D. Verify that the ammonia solution pump can be controlled by the computer on signals received from the pH/conductivity analyzer.

E. Verify the proper operation of all protective devices, controls, interlocks, instrumentation, and alarms. 15

14.2.12.2.68.4 Acceptance Criteria 34

The Chemical Feed System performs as described in Subsection 10.4.10. 18

*The test will be completed after initial fuel load but prior to exceeding 5% power. 29

14.2.12.2.73 MAIN CONDENSER AIR EVACUATION SYSTEM* 34

14.2.12.2.73.1 Objective

To demonstrate that the Main Condenser Air Evacuation System provides a 15
safe and reliable heat sink for normal operations. 8

14.2.12.2.73.2 Prerequisites 34

A. Construction activities on the systems to be tested are complete. 18

B. Permanently installed instrumentation is operable and calibrated. 29

C. Test instrumentation is available and calibrated.

D. Plant systems required to support testing are operable, or temporary systems are installed and operable.

E. Steam seals and lagging are available. 15

F. Turbine is on turning gear.

G. All electrical testing is complete on the vacuum pumps and condenser valves. 9

14.2.12.2.73.3 Test Method 34

A. Verify the integrity of the condenser. 8

B. Verify, if appropriate, the proper operation, failure mode, stroking speed, and position indication of control valves. 15

C. Demonstrate the proper operation of the vacuum pumps in all operating modes and flow paths.

D. Verify the proper operation of protective devices, controls, 8
interlocks, instrumentation, and alarms, using actual or
simulated inputs. 15

14.2.12.2.73.4 Acceptance Criteria 34

The Main Condenser Air Evacuation System performs as described in Section 10.4. 8

* This test will be completed after initial fuel load but prior to exceeding 5 percent power. 29

Question No.

640.18 (14.2.12) The ESF 125V DC System test (FSAR Subsection 14.2.12.2.1) was modified in response to Item 640.11, (1), to demonstrate that emergency loads can start and operate at the minimum battery design voltage. It is the staff's position that credit cannot be taken for vendor testing. Modify this test, or provide alternate tests, that demonstrate that the emergency systems, as constructed, are operable at the minimum battery design voltage.

Response

The ability of the ESF 125 V DC System loads to function properly at minimum design voltage has been verified in conformance with FSAR Subsection 14.2.12.2.1.

LP&L conducted tests to verify operability at minimum design voltage for those loads which were not tested by the suppliers. This testing included one relay, four types of solenoid valves (representing a total of 30 valves) and four of the six safety-related inverters. Testing was accomplished by providing a test power supply and verifying satisfactory performance. The motor operators for the Steam Driven EFW Pump Supply Valves were tested at minimum voltage by an outside testing organization.

All components were found to function satisfactorily at minimum voltage.

Question No.

640.19 (14.2.12) The response to Item 640.11, (2), and the Nitrogen System test (FSAR Subsection 14.2.12.2.13), should be modified to address FSAR Subsection 9.3.9, Nitrogen System, which was added by FSAR Amendment No. 34 (1/84).

Response

FSAR Subsection 14.2.12.2.13 and the response to NRC Question 640.11 will be amended as attached to address FSAR Subsection 9.3.9, Nitrogen System.

Question No.

640.11 (14.2.12) We could not conclude from our review of your Phase II and Phase III test descriptions that comprehensive testing is scheduled for several systems and components. Therefore, clarify or expand the appropriate test descriptions to address the following:

(1) 14.2.12.2.1 - Verify that each emergency load can start and operate at the minimum voltage level at which it can be postulated to operate, i.e., after the design discharge test.

(2) 14.2.12.2.13.4 - Provide a reference or actual criterion that stipulates the required design performance for the Nitrogen System.

(3) 14.2.12.2.17 - Modify this test description as necessary to conform to Regulatory Positions 2a(3), (5), (6)(a), (6)(b), and (9) and 2.b in Regulatory Guide 1.108.

(4) 14.2.12.2.18.3.E - Revise the test method to state that full operational testing will be accomplished at 100% of rated load.

(5) 14.2.12.2.19.3.E - Describe how you will verify that containment recirculation fan motor currents will be within design value under post-accident conditions. Provide a description of testing to be performed during the containment pressure test and address such issues as air density, temperature, humidity, fan speed and blade angle.

(6) 14.2.12.2.21.4 - Include Subsection 9.4.5.5 along with 9.4.5.8 as the references in acceptance criteria.

(7) 14.2.12.2.31.4 - Supply missing heading for acceptance criteria section.

(8) 14.2.12.2.36.4 - Modify the acceptance criteria to reference 5.4.13.4 or expand the criteria to more clearly verify adequate pressurizer safety valve performance.

(9) 14.2.12.2.44.3 - Modify the test description to verify correct flow paths and sampling procedures and to assure that sample holdup times are within allowable limits.

(10) 14.2.12.2.49; 50; and 51 - Describe tests that show conformance to positions 2.b. (2), (3); 2.c. (1), (4), (5); and 2.e of Regulatory Guide 1.79.

Refer to revised FSAR Subsection 14.2.12.2.13 & New subsection 9.3.9,

Response

(1) Refer to revised FSAR Subsection 14.2.12.2.1

(2) Acceptance criteria to prove the design performance of the nitrogen system are developed from system design documents including: flow diagrams, control wiring diagrams and component technical manuals. The nitrogen system is non-safety related and considered a non-essential test per the guidance of Regulatory Guide 1.68, but is tested to prove its design and construction.

(3) Refer to revised FSAR Subsection 14.2.12.2.17.

(4) The RB Polar Crane and the FHB Bridge Crane are initially tested at 125 percent load under static conditions and dynamically (operationally) at 100 percent load prior to construction use. Subsequent to these tests, administrative controls are implemented to ensure that all crane modifications or repairs are documented and approved by the WSG. In addition crane loads in excess of 50 percent of full load are recorded. These controls ensure that no modifications or overloads that would effect crane performance have occurred. Based on these tests and controls, and the JTG's review and approval of the results, the 100 percent load operational test will not be repeated for the RB Polar Crane. A no-load operational test as stated in FSAR Subsection 14.2.12.2.18.3 will be performed to reverify all control features, limits and protective devices. A 125 percent static test will be performed to demonstrate crane strength. The FHB crane will be tested under 125 percent static load and operationally at 100 percent load. Refer to revised FSAR Subsection 14.2.12.2.18.3.

(5) To demonstrate proper operation of the containment cooling fans under peak design accident pressure, the fans will be run at low speed with the containment pressurized to 44 psig, which is based on the design base accidents. Running currents will be verified to be less than the maximum allowed by the vendor. The conditions inside containment will be established by first purging, then filling the containment to the desired pressure using air at 75-78 F and 60-80 percent relative humidity. Temporary fans will be used to equalize temperatures inside containment. Blade angles will be set during air balancing, if necessary, however it is expected to be approximately 25.5 which was set by the vendor. Vendor testing included flow tests and testing under simulated accident conditions with the air density .173 lb/cu. ft. and the blade angle at 25.5.

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14.2.12.2.13 NITROGEN SYSTEM

14.2.12.2.13.1 Objective 8

To verify the functional performance of the Nitrogen System to provide nitrogen gas to related equipment at defined pressures. To verify that failure of the nonsafety-related portion of the system will not jeopardize the safety-related portion of the system.* 15

14.2.12.2.13.2 Prerequisites 8

A. Construction activities on the systems to be tested are complete. 18

B. Permanently installed instrumentation is operable and calibrated.

C. Test instrumentation is available and calibrated. 29

D. Plant systems required to support testing are operable, or temporary systems are installed and operable.

14.2.12.2.13.3 Test Method 8

A. Verify all control logic.

B. Verify the proper operation of the nitrogen pump in transferring nitrogen from the liquid nitrogen tank to the nitrogen gas tank.

C. Demonstrate that the system nitrogen regulator regulates and maintains nitrogen gas bulk flow at 725 psi. 15

D. Demonstrate that the related system nitrogen regulators respond on demand to defined system pressures. 8

E. Verify the proper operation of all protective devices, controls, interlocks, instruments, and alarms.

F. Verify, if applicable, the proper operation, failure mode, stroking speed, and position indication of control valves. 15

14.2.12.2.13.4 Acceptance Criteria 8

The Nitrogen System performs as ~~designed. Loss of nitrogen pressure does not result in the failure of any safety related valves in the unsafe position.~~ described in [redacted] Subsection 9.3.9. 15

* Safety-related valves will be tested in the individual system-related preoperational test. 15

Question No.

640.20 (14.2.12) The response to Item 640.13 should reference the Turbine Bypass and Atmospheric Steam Dump Valve Capacity test (FSAR Subsection 14.2.12.3.29) which addresses the concerns of this item.

Response

The response to NRC Question 640.13 will be amended as attached to reference the Turbine Bypass and Atmospheric Steam Dump Valve Capacity test (SIT-TP-707).

Q 640.20
1 OF 1

Question No.

640.13
(14.2.12)

We have noted on other plant startups that the capacities of pressurizer or main steam power-operated relief valves (PORV's) are sometimes in excess of the values assumed in the accident analyses for inadvertent opening or failure of these valves. Provide a description of the testing that demonstrates that the capacity of these valves is consistent with your accident analysis assumptions.

Response

Waterford does not have Pressurizer or Main Steam Power Operated relief valves. Testing of the Turbine Bypass and Atmospheric Dump Valves is described in FSAR subsection 14.2.12.3.29

Reference

No FSAR changes were made.

Question No.

640.21 (14.2.7) (14.2.12) Recent FSAR revisions have made modification to the various test abstracts, resulting in non-conformance with Regulatory Guide 1.68, Initial Test Programs for Water-Cooled Nuclear Power Plants, and Regulatory Guide 1.68.2, Initial Startup Test Program to Demonstrate Remote Shutdown Capability for Water-Cooled Nuclear Power Plants.

(1) FSAR Subsection 14.2.7.13.1 c) states that all control element assemblies will be dropped as a group at hot, no-flow conditions. This same subsection later states that no-flow drops will not be performed. FSAR Subsection 14.2.12.3.1, Control Element Drive Mechanisms, has been modified to delete no-flow drops. Modify FSAR Subsection 14.2.12.3.1 to conform with Regulatory Guide 1.68, Appendix A, Section 2.b, or modify FSAR Subsection 14.2.7.13.1 to provide technical justification for any exceptions to this regulatory position.

(2) FSAR Subsection 14.2.7.13.8 incorrectly references Regulatory Guide 1.68, Appendix A, Section 5.g, instead of Section 5.q. This exception should be deleted and appropriate test abstracts should be modified to demonstrate proper operation of the CVCS Process (Letdown) Monitor (FSAR Subsection 11.5.2.4.2.1) at 50% and 100% power.

(3) The Chemistry test (FSAR Subsection 14.2.12.3.16) should reinstate the analysis of samples by an independent facility, or technical justification should be provided for exception to Regulatory Guide 1.68, Appendix A, Section 5.z.

(4) The Remote Shutdown and Cooldown test (FSAR Subsection 14.2.12.3.33), or other appropriate test abstracts, should be modified to include demonstration of cold shutdown capability during the startup test program, or exception and technical justification should be provided to Regulatory Guide 1.68.2, Position C.4.

Response

(1) Amendment 35 (5/84) deleted paragraph 14.2.7.13.1(c) thus eliminating the inconsistency with respect to CEAs being dropped at no-flow conditions.

Experience at other CE plants has shown that drop time at no-flow conditions is faster than under full-flow conditions.

(2) This is a typographical error. Subsection 14.2.7.13.8 will be corrected as attached to indicate the correct reference.

(3) At Waterford 3 the independent laboratory or other analyses as required by RG 1.68 are performed by the Chemistry department.

(4) The remote cold shutdown capability test will be performed in accordance with RG 1.68.2 post-fuel load and prior to commercial opeartion as stated in Subsection 14.2.12.3.33.

Site personnel may require the services of technically qualified indivi- 8
duals to assist them in the performance of duties necessary to certify them
to a specific level of ANSI N45.2.6-1973. As such, site personnel may call 31
on the services of site or home office specialists to perform some of the 8
technical requirements of their duties, but only individuals qualified to 31
Level II per ANSI N45.2.6-1973 will provide their signatures on documents as
certification of the performance of the function.

14.2.7.11 <u>1.63 Electric Penetration Assemblies Containment Structures for Light-Water-Cooled Nuclear Power Plants (10/73)</u> 15

14.2.7.12 <u>1.65 Materials and Inspections for Reactor Vessel Closure Studs (10/73)</u> 15

14.2.7.13 <u>1.68 Initial Test Programs for Water-Cooled Reactor Power Plants (Revision 2, 8/78).</u> 15

The following exceptions and/or clarifications address only significant
differences between the Waterford-3 test program and the applicable
regulatory position. Minor terminology differences, testing not applicable
to the plant design, and testing that is part of required surveillance tests 15
will not be addressed. Reference is made to the applicable portion of 18
Regulatory Guide 1.68 (Revision 2, 8/78). 34

14.2.7.13.1 Reference Appendix A, Section 2.b

This section suggests that rod drop times be measured for all control element
assemblies (CEAs) at hot and cold full-flow and no-flow conditions.

Waterford-3 CEA drop-time testing is consistent with the recommendations of 15
the regulatory guide; however, tests which do not provide meaningful data
will be deleted. As outlined in test summary 14.2.12.3.1, the CEA drop-time
testing will consist of:

a) One drop of each CEA at cold, maximum permissible flow conditions (2 or 3 reactor coolant pumps) and at hot, full-flow conditions.

b) Those CEAs falling outside the two-sigma limit for similar CEAs will be dropped three additional times.

35
No-flow drops will not be performed as the Technical Specifications do not 34
normally permit criticality under these conditions.

14.2.7.13.2 Reference Appendix A, Section 3, and Appendix C, Section 3 15

These sections require that a neutron count rate of at least 1/2 count per
second should be registered on the startup channels before the startup
begins. Combustion Engineering's design criteria call for a neutron count 18

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rate of 1/2 count per second with all CEAs fully withdrawn and a multiplication of 0.98. Therefore, prior to the initiation of the initial approach to criticality, the startup channels may see significantly less than 1/2 15
count per second; but prior to exceeding a multiplication of 0.98, the desired neutron count rate will have been achieved.

14.2.7.13.3 Reference Appendix A, Sections 4.b and 4.c

These sections require a greatest worth control rod stuck out of the core test and a psuedo-rod-ejection test to be performed during low power testing. Since the Waterford-3 core is essentially identical to the San
Onofre core, these tests will not be performed at Waterford-3. Prior 34
to the omission of these tests, the similarity of the San Onofre Unit No. 2 and the Waterford-3 cores will be demonstrated by the performance of CEA symmetry checks, CEA worth measurements, and critical boron measurements.

14.2.7.13.4 Reference Section C.8 and Appendix A, Section 5

The standard CE test plateau power levels of 20, 50, 80, and 100 percent are used instead of the recommended power levels of 25, 50, 75, and 100 percent.

14.2.7.13.5 Reference Appendix A, Section 5.a 18

The complete set (20, 50, 80, and 100 percent power) of power reactivity coefficients will be measured at San Onofre Unit No. 2. Since the Waterford-3 core is essentially identical to the San Onofre Unit No. 2 core, the power reactivity coefficients will be measured only at 50 and 100 percent power.

14.2.7.13.6 Reference Appendix A, Sections 5.d, 5.e, and 5.f

The xenon oscillation control, pseudo-rod-ejection, and dropped CEA tests will be performed at San Onofre Unit No. 2, which has a core essentially identical to the Waterford-3 core. Since these tests are not necessary to assure system operation or to verify fuel and CEA
loading, they will not be performed at Waterford-3. The essentially 15
identical nature of the cores will be demonstrated by an analysis of CEA symmetry checks, CEA group worths, critical boron concentrations, and, in the power ascension phase, by incore detector data, prior to any reduction in the Waterford-3 testing.

14.2.7.13.7 Reference Appendix A, Section 5.i

Since the Plant Protection System (CPCs and CEACs) detects the CEA 18
positions by means of two independent sets of reed switches and uses this information in determining margin to trip, it is not necessary to
rely on incore or excore nuclear instrumentation to detect control element 15
misalignment. Thus, this testing will not be performed at Waterford-3.

14.2.7.13.8 Reference Appendix A, Section 5.g 34

Waterford-3 does not have a separate Failed Fuel Detection System.
Therefore, this step does not apply. 31

Question No.

640.22 (14.2.12) Recent FSAR revisions have inadequately renumbered various startup tests.

(1) The Natural Circulation test addressed in FSAR Subsection 14.2.12.3.15 (p. 14.2-125a) should be deleted in favor of the Biological Shield Survey test also addressed in FSAR Subsection 14.2.12.3.15 (p. 14.2-126), in accordance with FSAR Table 14.2-2, Phase III Tests. The test abstract for 14.2.12.3.25 should be modified to include the appropriate items contained in the deleted abstracts.

(2) The 100 Percent Load Rejection test addressed in FSAR Subsection 14.2.12.3.38 (p. 14.2-143) should be deleted and replaced by the Loss of Load Transients at 50 Percent, 80 Percent, and 100 Percent Power test also addressed in FSAR Subsection 14.2.12.3.38 (p. 14.2-141), in accordance with FSAR Table 14.2-2, Phase III Tests.

(3) The following tests listed in FSAR Table 14.2-5, Power Ascension Testing Sequence, should be revised to reference the correct FSAR subsection:

(a) 20% Power Plateau--Test 3)

(b) 50% Power Plateau--Tests 2), 4), 5), 15)

(c) 80% Power Plateau-Test 2

(d) 100% Power Plateau-Test 12)

Response

(1) Subsection 14.2.12.3.15 (p. 14.2-125a) was deleted via amendment 34 (1/84) in favor of Subsection 14.2.12.3.15, Biological Shield Survey (p. 14.2-126).

Subsection 14.2.12.3.25 will be amended as attached to include appropriate items contained in the deleted abstract.

(2) Subsection 14.2.12.3.38 on page 14.2-143 (Amendment 35) describes the Loss of Load Transients at 50 percent, 80 percent and 100 percent Power in accordance with FSAR Table 14.2-2, Phase III Tests.

(3) Table 14.2-5, Power Ascension Testing Sequence will be amended as attached to reference the correct FSAR Subsections.

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14.2.12.3.25 NATURAL CIRCULATION* 34

14.2.12.3.25.1 Objective

~~To evaluate natural circulation flow conditions.~~ 8

A. To provide operator training in natural circulation under various plant conditions as described in the TMI Action Plan Item I.G.1. and clarified in NRC Letter of November 14, 1980.

B. To evaluate natural circulation flow conditions and heat removal capability.

14.2.12.3.25.2 Prerequisites

The reactor is operating so as to provide a satisfactory heat source after a trip. This test is normally performed in conjunction with the 80 percent loss of flow test (see 14.2.12.3.34). 15 8 18

14.2.12.3.25.3 Test Method 8

A. All reactor coolant pumps are secured simultaneously.

B. The plant is tripped.

C. Reactor Coolant System (RCS) temperatures, pressurizer pressure and level, and steam generator levels and pressures are continuously recorded under the following conditions: 15

(1) Deenergized pressurizer heaters
(2) Reduced RCS pressure
(3) Isolated secondary side (feedwater and steam) of one steam generator

D. Natural circulation flow is verified by stabilized or gradually decreasing hot leg temperatures.

E. The natural circulation power-to-flow ratio is calculated.

14.2.12.3.25.4 Acceptance Criteria 18

A. The natural circulation power-to-flow ratio is less than 1.0.

B. Operator training requirements are met. 34

* Additional natural circulation testing is described in 14.2.12.3.35 and 14.2.12.3.41. 35 18

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TABLE 14.2-5

POWER ASCENSION TESTING SEQUENCE 18

Power	Tests	
20% Power Plateau	1) Biological Shield ~~Effectiveness~~ Survey (14.2.12.3.15)*	
	2) Process Variable Intercomparison (14.2.12.3.30)*	31
	3) Chemistry ~~and Radiochemistry~~ (14.2.12.3.19)* 2 16	
	4) Baseline Vibration and Loose Parts Monitoring (14.2.12.3.40)*	
	5) Deleted	35
	6) Nuclear and Thermal Power Calibration (14.2.12.3.27)	
	7) Core Performance Record (14.2.12.3.27)	31
	8) Movable Incore Detector Checks (14.2.12.3.3)	
	9) CPC/COLSS Verification (14.2.12.3.28)	
	10) Shape Annealing Matrix (14.2.12.3.28)	35
	11) Load Changes (Control Systems Checkout) (14.2.12.3.31)	
	12) Remote Reactor Trip with Subsequent Remote Plant Cooldown (14.2.12.3.33)	31

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TABLE 14.2-5 (Cont'd) 18

Power	Tests
50% Power Plateau	1) Process Variable Intercomparison (14.2.12.3.30)*
	2) Chemistry ~~and Radiochemistry~~ (14.2.12.3.19)*
	3) Reactor Internals Vibration Monitoring (14.2.12.3.40)*
	4) Biological Shield ~~Effectiveness~~ Survey (14.2.12.3.18)*
	5) Ventilation Capability (14.2.12.3.42)* 29
	6) Nuclear and Thermal Power Calibration (14.2.12.3.27)
	7) Core Performance Record (14.2.12.3.27)
	8) Movable Incore Detector Checks (if necessary) (14.2.12.3.3)
	9) CPC/COLSS Verification (14.2.12.3.27) 35
	10) Temperature Decalibration Verification (14.2.12.3.28)
	11) Shape Annealing Matrix (14.2.12.3.28)
	12) Radial Peaking Factor Verification (14.2.12.3.28)
	13) Variable Tavg (14.2.12.3.26) 29
	14) Load Changes (Control Systems Checkout) (14.2.12.3.31)
	15) RPCS 50% Loss of Load (14.2.12.3.39) 34
Pre 80% Power Plateau	1) RPCS 70% Loss of One Operating Feedwater Pump (14.2.12.3.42) 31
	2) Atmospheric Steam Dump and Turbine Bypass Valve Capacity Checks (14.2.12.3.29) 35

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TABLE 14.2-5 (Cont'd) 18

Power	Tests
80% Power Plateau	1) Process Variable Intercomparison (14.2.12.3.30)*
	2) Chemistry ~~and Radiochemistry~~ (14.2.12.3.19)* 16
	3) Reactor Internals Vibration Monitoring (14.2.12.3.40)* 29
	4) Nuclear and Thermal Power Calibration (14.2.12.3.27)
	5) Core Performance Record (14.2.12.3.27)
	6) Movable Incore Detector Checks (if necessary) (14.2.12.3.3)
	7) CPC/COLSS Verification (14.2.12.3.27) 28 35
	8) Load Changes (Control Systems Checkout) (14.2.12.3.31) 29
	9) 80% Total Loss of Flow/Natural Circulation Test (14.2.12.3.25) 34
	10) RPCS 80% Loss of Load (14.2.12.3.38) 31
Post-80% Power Plateau	1) Loss of Offsite Power Trip (14.2.12.3.35 and .41) 18
	2) Load Changes (Control Systems Checkout) (14.2.12.3.31)
	3) Nuclear and Thermal Power Calibration (14.2.12.3.27) 29

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TABLE 14.2-5 (Cont'd) 18

Power	Tests	
100% Power Plateau	1) Process Variable Intercomparison (14.2.12.3.30)*	29
	2) Chemistry ~~and Radiochemistry~~ (14.2.12.3.16)*	34
	3) Reactor Internals Vibration Monitoring (14.2.12.3.40)*	29
	4) Biological Shield ~~Effectiveness~~ Survey (14.2.12.3.15)*	34
	5) Ventilation Capability (14.2.12.3.32)*	31
	6) Nuclear and Thermal Power Calibration (14.2.12.3.27)*	29, 34
	7) Core Performance Record (14.2.12.3.27)	29
	8) Movable Incore Detector Checks (14.2.12.3.3)	
	9) CPC/COLSS Verification (14.2.12.3.27)	35
	10) Variable Tavg (14.2.12.3.26)	29
	11) Load Changes (Control Systems Checkout) (14.2.12.3.31 and .39)	
	12) 100% Turbine Trip - Load Rejection (14.2.12.3.38) 37	34
	13) 100% Generator Trip - Load Rejection (14.2.12.3.38)	

The table is representative of the actual testing sequence to be performed at Waterford SES 3. However, based on future startup experience, the testing sequence may be modified to improve and/or optimize testing.

18

*May be conducted at any time during the test plateau. All other tests are expected to be accomplished in the order given.

14.2.12.3.16.4 Acceptance Criteria 34

A. Chemistry of the RCS and the steam generators is maintained within specifications in accordance with ~~CENPD-28, Combustion Engineering, Nuclear Steam Supply System Chemistry Manual, Revision 2.~~ FSAR Subsections 9.3.2 and 10.3.5. 18

B. Appropriateness of established sampling frequencies is demonstrated in accordance with ~~CENPD-28, Combustion Engineering, Nuclear Steam Supply System~~ Chemistry Manual, ~~Revision 2.~~ Waterford 3 Chemistry Department Procedures.

C. Baseline data for RCS and steam generator chemistry are established.

D. Procedures for sample collection and analysis are verified as acceptable. 8

E. Baseline activity levels for the RCS are established.

F. Laboratory analyses agree satisfactorily ~~with the~~ such that process radiation monitors ~~within the combined accuracy of the analyses and the radiation monitor.~~ indicate proper response. 18

14.2.12.2.3 SAFETY-RELATED ~~AND NONSAFETY-RELATED~~ INVERTERS 18

14.2.12.2.3.1 Objective 8

To verify proper operation of safety-related ~~and nonsafety-related~~ in- 18
verters and transfer devices and to demonstrate that the inverters supply 15
full design capacity.

14.2.12.2.3.2 Prerequisites 8

A. Construction activities on the systems to be tested are complete. 18

B. Plant systems required to support testing are operable, or temporary systems are installed and operable. 15

C. Dummy load bank is available.

14.2.12.2.3.3 Special Prerequisites 8

A. Diesel generator testing will be performed concurrently with this test. Portions of the testing in 14.2.12.2.3.4 below will be performed in conjunction with diesel generator testing (Subsections 29
14.2.12.2.17 and 14.2.12.2.93).

14.2.12.2.3.4 Test Method 8

A. Verify all control logic. 15

B. Verify the proper operation of the inverters, manual transfer 8
switches, frequency synchronization, and blocking diodes. 15

C. Simulate normal and abnormal operating conditions and verify that the computer/annunciator reacts to these conditions. 18

15

D. Verify that each inverter automatically transfers the input to the 8
battery upon loss of preferred power while maintaining uninterrupted 18
power output.

E. Using a dummy load bank, verify that the inverters supply 120V ac at 15
full load, using the normal power source.

29

F. Place the battery chargers on equalize and verify that dc equalizing voltage will not result in driving the inverter, relieving the 15
rectifier from carrying the inverter load.

G. Verify proper operation of all protective devices, controls, inter- 29
locks, alarms, and computer inputs. 18

14.2.12.3.28 VERIFICATION OF CPC POWER-DISTRIBUTION-RELATED CONSTANTS 15

14.2.12.3.28.1 Objective 8

To verify the planar radial peaking factor, shape annealing matrix, boundary 31
point power correlation coefficients, temperature calibration constants,
and rod shadowing factor, and to verify the algorithms used in the core 15
protection calculators (CPCs) to relate excore signals to incore power 18
distributions. 15

14.2.12.3.28.2 Prerequisites 8

A. The Incore Detector System operates satisfactorily.

B. The safety channels are calibrated and operating satisfactorily. 15

C. The reactor is critical and at the applicable power level (20 percent, 50 percent). 8

14.2.12.3.28.3 Test Method

A. Determine the planar radial peaking factor for all rods out and various other control element assembly (CEA) configurations by analysis of incore detector readings. Compare these values with 15
the CPC values (50 percent power only). 35

B. For various CEA configurations, determine rod shadowing factors from 15
excore detector readings and compare them to the CPC values (50 percent power only). 35

C. Determine shape annealing matrix and boundary point power correlation coefficients by analysis of incore detector readings during xenon 31
oscillations and compare them to the CPC values. ~~(50 percent power only).~~ 35

D. Verify temperature decalibration constants (50 percent power only). 15

14.2.12.3.28.4 Acceptance Criteria 8

The measured radial peaking factors determined from incore flux maps are no higher than the corresponding values used in the CPCs. Other CPC power-
distribution-related constants, used in the power distribution synthesis, 15
are satisfactorily in agreement with the predicted values. 8