

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-443/85-26

Docket No. 50-443

License No. CPPK-135

Category B

Licensee: Public Service Company of New Hampshire
1000 Elm Street
Manchester, New Hampshire 03105

Facility Name: Seabrook Station, Unit 1

Inspection At: Seabrook, New Hampshire

Inspection Conducted: September 23-27, 1985

Inspectors:

L. Briggs, Lead Reactor Engineer

10/17/85
date

for L. Wink, Reactor Engineer

10/17/85
date

Approved by:

P. Eselgroth, Chief, Test Programs
Section, OB, DRS

10/25/85
date

Inspection Summary:

Inspection on September 23-27, 1985 (Report No. 50-443/85-26)

Areas Inspected: Routine, unannounced inspection by two region-based inspectors (72 hours) of preoperational test witnessing, preoperational test procedure review and verification, preoperational and acceptance test results evaluation review, independent verification, QA interface with preoperational testing and facility tours.

Results: No violations were identified.

DETAILS

1.0 Persons Contacted

S. Baldacci, Quality Assurance (QA) Engineer (YAEC)
J. Burson, Hot Functional Test (HFT) Coordinator
*M. Cronin, Engineer, Licensing (NHY)
*G. Kann, Phase 2-6 Test Group Manager (NHY)
G. Kingston, Compliance Manager (NHY)
*D. Lambert, Principal Field Quality Control (QC) Manager (VE&C)
W. Mackensen, Preoperational Test Supervisor (NHY)
*J. Marchi, Startup QC Manager (NHY)
*P. Massicotte, Staff Engineer (NHY)
*W. Middleton, QA Staff Engineer (NHY)
*D. Perkins, QA Engineer (NHY)
K. Robson, Startup Coordinator, Thermal and Vibration (NHY)
W. Sanchez, Engineer Licensing (NHY)
K. Seitz, Hydro System Coordinator (NHY)
*J. Singleton, Assistant QA Manager (NHY)
*J. Tefft, Startup and Test Department (STD) Special Assistant (NHY)
*W. Temple, STD QA Supervisor (NHY)
B. Wolfe, QC Engineer (NHY)

Other NRC Personnel Present

R. Barkley, Reactor Engineer
A. Cerne, Senior Resident Inspector
D. Ruscitto, Resident Inspector

The inspectors also contacted other licensee personnel during the course of the inspection.

*Denotes those present at the exit meeting conducted on September 27, 1985.

2.0 Preoperational and Phase I Test Witnessing

2.1 Scope

Testing witnessed by the inspector included the observations and overall personnel performance identified in Paragraph 3.1 of NRC:RI Inspection Report 50-443/85-21.

2.2 Preoperational Testing Witnessed

2.2.1 Emergency Feedwater System (EFW), 1-PT-14.1

On September 25, 1985 the inspector witnessed performance of steps 6.9.1 through 6.9.12, circuit breaker logic and control

testing of the motor driven EFW pump. Testing observed met the criteria of Paragraph 2.1 above. On September 26, 1985 the inspector reviewed the field copy of the procedure to verify that prerequisites were signed off and that any field changes or exceptions in effect did not affect the intent of the procedure. Since the procedure had been started late the previous day only those steps witnessed by the inspector had been completed. The inspector noted that the latest reference revisions had not been recorded although prerequisite step 3.1 had been signed stating that the latest revisions had been checked. The System Test Engineer (STE) stated that he had reviewed the latest revisions but had not recorded them in the appropriate section of the procedure. The inspector discussed this item with the Phase 2-6 Test Group Management and the STE. The Test Group Manager took immediate action to counsel the STE and agreed to draft a memo to all STD personnel to ensure that such an oversight does not recur. The inspector noted that this particular occurrence had no safety implication since this was the first such occurrence observed and that only twelve (12) procedural steps had been completed, none of which were affected by the oversight. This area has received close scrutiny during past inspections and will continue to be closely observed during future inspections.

2.2.2 Findings

Pm violations were identified.

2.3 Phase I (Construction) Testing Witnessed

2.3.1 Integrity Test DG-IT-21, 'A' Emergency Diesel Generator (EDG) Jacket Cooling System

On September 26, 1985 the inspectors observed the hydrostatic integrity test being conducted on the 'A' EDG jacket cooling water system shell side. The inspector discussed the test with the STE and reviewed DG-IT-21. Jacket pressure was increased to 94 PSIG and the pressure source secured at which point pressure held at 94 PSIG (125 percent of design) for 2½ hours with no decay. Five test exceptions were identified, two small flange leaks, one arc strike, one joint not shown on piping diagrams and one inaccessible joint (tested on September 20, 1985). The inspector noted that proper system boundaries had been established and that QC coverage was being provided by both the architect engineer and the piping contractor (N stamp holder). In addition an authorized nuclear inspector was present.

2.3.2 Findings

No unacceptable conditions were identified.

3.0 Preoperational Test Procedure Review and Verification

3.1 Scope

The preoperational test procedures listed in Attachment A were reviewed in preparation for test witnessing, technical and administrative adequacy and verification that testing planned would adequately satisfy regulatory guidance and licensee commitments. The procedures were reviewed to verify proper licensee review and approval, correct format, test objectives, prerequisites, initial conditions, test data recording requirements, technical adequacy and system return to normal.

3.2 Discussion

3.2.1 1-PT-2.1

The inspector reviewed 1-PT-2.1 in detail and independently verified that all system operating modes, including associated logic, alarms and interlocks, were being adequately tested.

The Pressurizer Relief Tank preoperational test is divided into two procedures, 1-PT-2.1 and 1-PT-2.2. 1-PT-2.1 checks the systems alarms interlocks and logic in all operational modes including simulation of conditions following the limiting design basis discharge from the pressurizer. 1-PT-2.2, performed during Hot Functional Testing, monitors system response to an actual discharge of steam from the pressurizer and verifies acceptable system performance. 1-PT-2.2 was not reviewed during this inspection.

The inspector noted several procedural deficiencies including improper initial valve lineup for tank venting and several cases of step sequencing that would have resulted in unnecessarily large amounts of nitrogen being vented to confined spaces. Following discussions with the Phase 2-6 Test Group Manager it was agreed that procedural changes would be made to address these deficiencies. The revised procedure will be reviewed during a future routine inspection.

3.2.1.1 Findings

No unacceptable conditions were noted.

3.2.2 1-PT-15.4

The inspector reviewed 1-PT-15.4 in detail and independently verified that system operation, including associated logic, alarms and interlocks were being adequately tested.

The Service Water preoperational test is divided into eleven (11) procedures. 1-PT-15.4 tests the heating, ventilating and air conditioning system servicing the service water cooling tower pumps. Proper operation of the system is verified under both high and low temperature conditions including automatic starting and stopping of fans, positioning of dampers and actuation of required alarms.

3.2.2.1 Findings

No unacceptable conditions were noted.

3.2.3 1-PT-15.5

The inspector reviewed 1-PT-15.5 in detail and independently verified that system flow rates in the various operation modes were being adequately measured.

1-PT-15.5 verifies that the Service Water System can achieve the design flow rates through the diesel generator cooling water jacket and the closed cooling water system heat exchanger during operation with either the service water pumps or the cooling tower pumps. Each of the four service water pumps and the two cooling tower pumps is tested independently in its required operational mode.

3.2.3.1 Findings

No unacceptable conditions were noted.

3.2.4 1-PT(I)-41

The inspector reviewed 1-PT(I)-41 in detail and independently verified that it provided the appropriate control and guidance to safely conduct the initial plant heatup from a cold, solid condition to normal operating pressure and temperature. In addition the procedure adequately controlled and sequenced the testing planned during the heatup.

Hot functional preoperational testing is controlled by three separate procedure, 1-PT(I)-41, 1-PT(I)-40 and 1-PT(I)-42. 1-PT(I)-41 is the controlling procedure for the heatup to normal

operating temperature and pressure, 1-PT(I)-40 concerns testing at rated temperature and pressure and 1-PT-(I)-42 controls the sequence of events during cooldown to cold conditions. In all cases the procedures make use of normal plant operating procedures to maneuver the plant to accommodate testing. The procedures also establish the sequence of Hot Functional Testing and serve as a control mechanism to insure that all required tests are performed.

During the procedure review it was noted that a step had been inadvertently left out of the procedure. This problem was identified to the Phase 2-6 Test Group Manager.

3.2.4.1 Findings

No unacceptable conditions were noted.

3.2.5 1-PT(I)-40

The inspector reviewed 1-PT(I)-40 in detail and independently verified that it provided the appropriate control and guidance to safely conduct Hot Functional Testing. In addition the procedure adequately controlled and sequenced the planned testing.

3.2.5.1 Findings

No unacceptable conditions were noted.

3.2.6 1-PT-33.1

The inspector reviewed 1-PT-33.1 in detail and independently verified that testing would be conducted to satisfy licensee Final Safety Analysis Report (FSAR) and Regulatory Guide (RG) commitments. During the review the inspector noted that no start attempts of the diesel were made during the licensee's verification of air receiver capacity checks. The air start system for each emergency diesel generator (EDG) consists of one air compressor and two air receivers. Each air receiver is designed to allow five starts or attempted starts of the EDG. The licensee's test was written to perform five nine second rolls of the EDG then recharge the air receiver then start the diesel. The inspector expressed concern that this method of testing did not really show that the EDG could start from one air receiver when it was partially discharged. Through discussions the inspector and the licensee agreed that nine second rolls would use more air than starting the diesel which might take three to five seconds. The final resolution was

that four nine second rolls would be performed followed by a start of the diesel on the fifth attempt without recharging the air receiver. The inspector also discussed several other items with the licensee and determined that the licensee's method of testing fully satisfied the licensee's commitments.

3.2.6.1 Findings

No violations were identified.

3.2.7 1-PT-14.1

The inspector reviewed 1-PT-14.1 in detail and independently verified that system operation, including associated logic, alarms and interlocks were being adequately tested. A portion of the performance of this test was also witnessed by the inspector (Paragraph 2.2.1).

3.2.7.1 Findings

No unacceptable conditions were noted.

3.2.8 1-PT(I)-42

The inspector reviewed 1-PT(I)-42 to verify that adequate guidance was provided to safely conduct plant cooldown subsequent to hot functional testing and that appropriate plant procedures were referenced to conduct the required evolutions.

3.2.8.1 Findings

No unacceptable conditions were noted.

4.0 Preoperational and Acceptance Test Results Evaluation Review

4.1 Scope

The completed test procedures listed below were reviewed during this inspection to verify that adequate testing had been conducted to satisfy regulatory guidance, licensee commitments and FSAR requirements and to verify that uniform criteria are being applied for evaluation of completed test results in order to assure technical and administrative adequacy.

The inspector reviewed the test results and verified the licensee's evaluation of test results by review of test changes, test exceptions, test deficiencies, "As-Run" copy of test procedure, acceptance criteria, performance verification, recording conduct of test, QC

inspection records, restoration of system to normal after test, independent verification of critical steps or parameters, identification of personnel conducting and evaluating test data, and verification that the test results have been approved.

- 1-AT-1.2, Steam Generator Feed Pump Turbine B Uncoupled Testing, Revision 1, results approved September 13, 1985;
- 1-PT-15.6, Cooling Tower Pump Performance at Various Water Levels, Revision 1, results approved August 30, 1985;
- 1-PT-15.8, Service Water Pump Performance at Water Level of EL-8FT and EL-37FT, Revision 1, results approved August 30, 1985;
- 1-PT-19.1, Reactor Protection System, Revision 0, results approved August 30, 1985; and,
- 1-AT-1.1, Steam Generator Feed Pump Turbine A Uncoupled Testing, Revision 1, results approved September 13, 1985.

4.2 Discussion

4.2.1 1-AT-1.2

Five (5) minor test exceptions were identified in the test of which two (2) remain open. The first open test exception involved the failure to receive a computer alarm (D4727) when the Active Thrust Bearing Test Switch (CS-PB-2B) was placed in the "test" position. A work request (FW-0830) was issued to resolve this problem. The second open test exception was failure of the turbine to operate in the required speed acceptance band (5352-5460 RPM) at its high speed stop (HSS). When operated by the slave controller (SK-509C) the recorded speed at the HSS was 5342 RPM while operation by the master controller (SK-509A) resulted in a speed of 5341 RPM at the HSS. A work request (FW-0844) was issued to resolve this problem.

4.2.2 1-PT-15.6

The inspector reviewed the test results of 1-PT-15.6 and performed independent calculations of pump head to verify the licensee's calculations. No discrepancies were identified.

Two (2) test exceptions were identified in the test and satisfactorily resolved. Both exceptions involved the failure of the cooling tower pumps to meet the design head of 175 FT at design flow of 13,000 GPM. The pumps failed to achieve the required

head at all water levels tested, with pump 1-SW-P110A having a minimum measured head of 160 FT and pump 1-SW-P110B having a minimum measured head of 153 FT. The test data indicated that the pump head shortfall occurred over the entire range of test flow rates and tended to increase with increasing flow rates. A Non-Conformance Report (NCR 82-259) was issued to document the deficiencies. Following a review and evaluation by the responsible engineering groups, including consultation with the pump vendor and retesting, it was determined that the pump performances were acceptable "as-is." Both cooling tower pumps were capable of achieving the design flow of 13,000 GPM. The ability of the pumps to provide design flow rates in their required operational modes will be demonstrated during the performance of 1-PT-15.6, Service Water Flow Balancing.

A discussion was held with the Phase 2-6 Test Group Manager concerning these results. It was determined that the licensee is preparing a complete review of the service water system to address several identified problem areas. Preliminary indications are that limits may have to be imposed on the temperature of the Cooling Tower Basin (Ultimate Heat Sink) and that these limits may in turn place operating restrictions on the service water system. This item is unresolved pending completion of the licensee's evaluation and subsequent NRC:RI review (443/85-26-02).

4.2.3 1-PT-15.8

The inspector reviewed the test results of 1-PT-15.8 and performed independent calculations of pump head to verify the licensee's calculations. No discrepancies were identified.

Four (4) test exceptions were identified in the test and satisfactorily resolved. The exceptions involved the failure of the service water pumps to meet the design head of 165 FT at design flow of 10,500 GPM. The pumps failed to achieve the required head at the water levels tested with the following results:

<u>PUMP</u>	<u>MINIMUM MEASURED HEAD</u>
1-SW-P41A	145 FT
1-SW-P41B	149 FT
1-SW-P41C	160 FT
1-SW-P41D	150 FT

The test data indicated that the pump head shortfall occurred over the entire range of test flow rates and tended to increase with increasing flow rates. A Non-Conformance Report (NCR-82-360) was issued to document the deficiencies. Following a review and

evaluation by the responsible engineering groups, including consultation with the pump vendor and retesting, it was determined that the pump performances were acceptable "as-is." All four service water pumps were capable of achieving the design flow of 10,500 GPM. The ability of the pumps to provide design flow rates in their required operational modes will be demonstrated during the performance of 1-PT-15.6, Service Water Flow Balancing.

4.2.4 1-PT-19.1

The inspector reviewed the test results of 1-PT-19.1 and performed independent calculations of several step change trip inputs into the Reactor Protection System (RPS). No discrepancies were identified. The inspector also reviewed several visicorder traces to verify appropriate data were recorded. 1-PT-19.1 does not require specific response time acceptance criteria. A separate test 1-PT-19.2, Response Time Evaluation will combine RPS response times with instrument, breaker and sensing line response times to obtain an overall loop/system response time. The results of 1-PT-19.2 (which has not yet been performed) will be reviewed during a future NRC inspection. No test exceptions were identified by the licensee during the performance of 1-PT-19.1.

4.2.5 1-AT-1.1

One test exception (No. 2) remained open at the completion of this test. The uncoupled speed of the turbine was two RPM above its acceptance criteria of 3737 RPM at the low speed stop. This item is being tracked by the licensee under Incomplete Item List (IIL) number FW 0843.

4.3 Findings

No discrepancies or violations were identified during the above review. The licensee assigns open test exceptions to the IIL for tracking and closure purposes. The inspector routinely assigns an unresolved item number to open test exceptions that are desired to be tracked. The following open test exceptions identified in previous NRC reports are being consolidated into one unresolved item (443/85-26-01) and unresolved items 443/85-12-01, 443/85-16-01 and 443/85-23-01 are closed.

<u>Procedure No.</u>	<u>Short Title</u>	<u>IIL No.</u>
1-PT(I)-35	RCS Hydro	RC-0684, RC-0763, RC-0696, RC-0698, RC-0802, RC-0847, RC-848, RC-849, RC-850, RC-852
1-PT-17.1	Spent Fuel Cooling	SF-0163
1-PT-17.2	Spent Fuel C/U	SF-0161 and SF-0162
1-PT-10	SI Accum. Blowdown	SI-0426 and active Work Request ST-0425
1-AT-13.1	Fire Pump Flow Cap	FP-0420 and FP-0419
1-PT-8	ECCS Performance	SI-0459, SI-0458 and RH-0400
1-PT-18.1	Nuclear Instrumentation	NI-0093, NI-0094 and NI-0092
1-PT-12.1	Containment Spray	CBS-0595 and CBS-0594
1-AT-3.1	Condensate	CAS-0192
1-PT(I)-1	Reactor Coolant Pumps	Work Request No. RC-0804

5.0 Independent Verification

The inspectors performed independent calculations of pump head values and step change inputs as discussed in Section 4.2 of this report.

6.0 QA/QC Interface with the Preoperational and Phase I Test Program

The inspector verified QA/QC personnel were present and witnessing the conduct of preoperational and Phase I testing activities discussed in Paragraph 2.2.1 and 2.3.1 of this report. QA surveillance reports were not reviewed because all filing cabinets were sealed by the licensee in anticipation of Hurricane Gloria.

7.0 Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable, an item of noncompliance or a deviation. An unresolved item concerning open test exceptions is identified in Paragraph 4.3 of this report. An additional unresolved item concerning the service water system is discussed in Paragraph 4.2.2.

8.0 Plant Tours

The inspector made several tours of various areas of the facility during normal and backshift hours to observe work in progress, housekeeping, cleanliness controls, status of construction and preoperational testing activities.

No unacceptable conditions were noted.

9.0 Exit Interview

A management meeting was held at the conclusion of the inspection on September 27, 1985, to discuss the inspection scope, findings and observations as detailed in this report (see Paragraph 1 for attendees). No written information was provided to the licensee at any time during this inspection. The licensee indicated that no proprietary information was contained in the scope of this inspection.

ATTACHMENT A

Preoperational Test Procedures Reviewed

- 1-PT-2.1, Pressurizer Relief Tank Test, Revision 2, approved August 30, 1985
- 1-PT-15.4, Service Water System Cooling Tower HVAC, Revision 1, approved August 14, 1985
- 1-PT-15.5, Service Water Flow Balancing, Revision 0, approved July 24, 1985
- 1-PT(I)-41, Integrated Plant Heatup For Hot Functional Testing, Revision 0, approved August 30, 1985
- 1-PT(I)-40, Hot Functional Testing, Revision 0, approved August 30, 1985
- 1-PT-33.1, Emergency Diesel Generators, Revision 0, approved August 8, 1985
- 1-PT-14.1, Emergency Feedwater System, Revision 0, approved September 18, 1985
- 1-PT(I)-42, Integrated Plant Cooldown from Hot Functional Testing, Revision 0, approved August 30, 1985