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REGION I

Report No. 50-443/90-83

Docket No. 50-443

License No. NPF-86

Licensee: Public Service Company of New Hampshire

Facility: Seabrook Station, Seabrook, New Hampshire

Inspection Conducted: May 26 - August 31, 1990

Inspectors: See Attachment A

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Inspection Summary: Team Inspection of the power ascension test program conducted May 26 - August 31, 1990 (Report No. 50-443/90-83)

Areas Inspected: Power Ascension Program review, procedure review, test performance witnessing and test results evaluation.

Inspection Results: Our inspectors conducted round-the-clock observation of the Power Ascension Test Program (PATP) and concluded that the program was implemented in a controlled and safe manner. Test program staff were knowledgeable and effective in implementing the PATP. Operations personnel were well trained and conducted power ascension testing in a safe and professional manner. Evaluation of test results indicate that operating parameters satisfy design criteria provided in the FSAR and Technical Specifications. No violations were identified.

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1.0 Executive Summary

On May 26, 1990, the NRC Special Inspection Team for the Power Ascension Test Program (PATP) inspection at Seabrook Station resumed round-the-clock coverage of test activities. Original coverage had been initiated on March 16, 1990 and suspended on May 2, 1990. Details of the first inspection period (March 16 - May 2, 1990) are contained in NRC Inspection Report No. 50-443/90-81. Following the modification of the low pressure section of the turbine, the station entered Mode 2 operation on May 26, 1990 and Mode 1 on May 27, 1990.

During this inspection period (May 26 - August 31,1990), the inspectors witnessed all tests mandated by the NRC Inspection Manual Chapter 2514, "Light Water Reactor Inspection Program, Startup Testing Phase." No safety significant issues were identified. NRC inspectors' concerns regarding test activities were adequately resolved by the licensee. The startup program and operations staff were observed to be competent and knowledgeable of procedures and program requirements. Tests were conducted in a safe, controlled and deliberate manner. Training, pre-test briefings, and management involvement had a positive effect on the power ascension test program performance. Throughout this inspection period, the inspectors observed the licensee complying with program requirements.

NRC inspectors have also completed all test procedure review, test witnessing and results evaluation mandated by the NRC inspection program. The inspectors found that test results packages were complete, and results either satisfied predetermined acceptance criteria or were properly evaluated. Test results packages were also evaluated to ascertain that test changes were properly incorporated and test deficiencies, if any, were properly resolved and documented. NRC inspectors' concerns regarding test results packages were adequately resolved by the licensee. No safety significant issues were identified.

During this inspection period, two unplanned reactor trips occurred. Both trips were witnessed and evaluated by the inspectors. The first trip occurred on June 20, 1990 as a result of a generator lockout and a turbine trip. The plant was at 30% power when this trip occurred. The second trip occurred on July 5, 1990. This trip was initiated by the inadvertent actuation of two of the three Electro Hydraulic Controller (EHC) low oil pressure switches. The plant was at 75% power when this trip occurred.

Testing activities were completed on August 1, 1990 with the completion of the Loss Of Offsite Power Test. On August 5, 1990, at 5:00 p.m., the plant started a 250-hour warranty run. On August 17, 1990 at 6:00 p.m., the warranty run was successfully completed.

2.0 Introduction

The purpose of the power ascension test inspection is to verify that the licensee is meeting the requirements and commitments made in the facility license, FSAR, and Regulatory Guides for power ascension testing. Verification is to be achieved through reviewing procedures and records, direct observation, witnessing tests, reviewing test data, and evaluating test results.

This inspection is conducted in accordance with the NRC Inspection Manual (IM) Chapter 2514. IM 2514 divides startup tests into four categories (I-IV) with Category I tests being the most safety significant. A list of the licensee's startup test procedures selected for the NRC inspection program with their respective categories is provided in Attachment B. NRC Inspection Manual 2514 requires procedure review, test witnessing and test results evaluation for all Category I power ascension tests. In addition, Category I, II and III Power Ascension Test Program procedures were also reviewed. Comments provided to the licensee by the NRC on the procedures were either incorporated into the test procedures or properly evaluated and dispositioned by the licensee. Performance of selected sections of all Categories I and II tests were witnessed by NRC inspectors. Those tests performed at multiple power plateaus were routinely witnessed at each plateau. In addition to witnessing Categories I and II tests, NRC inspectors also witnessed a number of Category III tests. Test results for all Categories I and II tests were evaluated. Results of Category III tests were reviewed to ascertain that the licensee's evaluation of the test results indicated satisfactory results. There are no inspection requirements for Category IV startup tests.

3.0 Procedure Review (Inspection Module 72300)

The inspectors reviewed selected startup procedures to ascertain that tests procedures satisfied test objectives, contained appropriate acceptance criteria, and required the documentation of sufficient information to permit adequate evaluation of test results. All startup test procedures designated as Categories I, II and III by the NRC (see Attachment B), were reviewed by the inspectors. Inspection Manual Chapter 2514 requires that all Categories I and II procedures be reviewed. Category III inspection requirements are to ascertain that approved procedures exist for performing these tests. The inspectors verified that the PATP included procedures for all tests described in Regulatory Guide 1.68, Appendix A (Initial Test Program), Paragraph 5 (Power Ascension Tests). The inspectors also verified that these procedures were in accordance with the guidance provided in Appendix C (Preparation of Procedures), Paragraph 4 (Low Power and Power Ascension Procedures) of Regulatory Guide 1.68.

The inspectors' concerns, regarding the content of the test procedures, were adequately resolved by the licensee. The inspectors concluded that test procedures for the PATP were satisfactorily prepared and technically correct. Details of the licensee's program and guidelines for writing test procedures are contained in Section 4.0 of NRC Inspection Report 50-443/90-81.

4.0 Test Witnessing (Inspection Module 72302)

Inspection Manual Chapter 2514 requires that all Category I tests be witnessed during test performance. The Manual Chapter does not require witnessing 100% of all Category II and III tests. However, selected sections of all Category II and III tests were witnessed by the inspectors.

The licensee performed a pre-test briefing for all PATP tests in accordance with PATP procedure SM 8.1. The inspectors attended these briefings and verified that they were conducted in accordance with procedure SM 8.1; test and operations personnel were knowledgeable of test requirements; and test termination criteria were discussed and understood.

The power ascension tests were witnessed to ascertain that the licensee was conducting the PATP in the manner described in the licensee's administrative and test procedures and that tests were being performed in a technically competent manner. To satisfy these objectives, the inspectors:

- Observed and assessed startup and operations staff performance.
- Assessed the adequacy of test program records, including preliminary evaluation of test results.
- Assessed the licensee's conformance to regulatory, procedural, and administrative program requirements.

The inspectors concluded that:

- Testing was performed in accordance with approved procedures by knowledgeable test and operation personnel.
- Problems encountered were handled adequately in accordance with program procedures.
- Management was kept informed of ongoing activities and was responsive in resolving identified issues.

4.1 ST-38, Unit Trip from 100% and ST-22, Natural Circulation

The Unit Trip from 100% Test (Category I test) was performed on July 29, 1990 and was immediately followed by the Natural Circulation Test ST-22. ST-38 successfully demonstrated the ability of the primary and secondary systems, and the automatic control systems to sustain a trip from 100% power and to return the plant to stable conditions following the transient. The unit trip was initiated at 8:00 a.m. by manually opening the main generator breaker from the Main Control Board (MCB) causing the turbine to trip, resulting in a reactor trip. Following the plant trip, the inspectors observed the following:

- All shutdown and control rods fully inserted (on the bottom)
- Safety injection was not actuated
- The pressurizer was not emptied

The control room operators responded appropriately to the plant trip. The Unit Shift Supervisor directed the shift crew through the steps of Emergency Operating Procedures for reactor trip response. The plant was safely brought to a hot no-load condition.

At 9:18 a.m., ST-22 was initiated by manually tripping all four Reactor Coolant Pumps (RCPs). This test demonstrated that the Reactor Coolant System (RCS) can transition from forced to natural circulation. The transition occurred smoothly and within 11 minutes of initiation, natural circulation was established and stabilized. Auxiliary spray for pressurizer pressure control was aligned 3 minutes after the RCPs tripped. Test termination criteria values were not approached. Stable plant conditions were ensured by manual manipulation of the auxiliary spray for pressure control, adjustment of charging and letdown flow, and cycling of Atmospheric Steam Dump Valves (ASDVs) to provide a means of automatic heat rejection. At 10:00 a.m., restoration from natural circulation was initiated, the RCPs were restarted and forced circulation was re-established.

The inspectors concluded that these tests were adequately performed in accordance with the test procedures.

4.2 ST-39, Loss of Offsite Power

The Loss Of Offsite Power (LOOP) test (Category I test) was performed on August 1, 1990 from a reactor power of approximately 20%. The test was witnessed by four inspectors stationed in the Control Room and at various locations throughout the plant. The LOOP test successfully demonstrated that the reactor can be maintained in a stable shutdown condition under natural circulation with a loss of offsite power. The test verified that the emergency electrical power system will respond in accordance with design under the condition of a loss of offsite power, coincident with a loss of the main generator.

The test was initiated at 9:40 a.m. from approximately 20% rated thermal power, just above the P-9 (reactor trip/turbine trip) permissive, by simultaneously tripping the turbine-generator and opening the offsite power source control breaker. The inspectors observed the following:

- The reactor tripped and eventually stabilized under natural circulation conditions.
- The Emergency Power Sequencer actuation occurred.

- Both Trains "A" and "B" emergency diesel generators started and powered up the emergency buses.

- Safety injection was not actuated.

The test personnel and operating shift crew performed adequately. They adhered to procedures and showed a comprehensive understanding of ongoing activities. This reflected the thorough pre-test training and briefing that the crew had received. The inspectors did not observe any unsafe conditions.

At 10:13 a.m., plant personnel began recovering from the loss of offsite power test. The inspectors verified that the minimum test duration of 30 minutes specified for this test was met prior to initiation of the recovery process. Offsite power was safely restored and both diesel generators were secured. The inspectors concluded that the test was satisfactorily completed.

4.3 ST-29, Core Performance Evaluation

The Core Performance Evaluation (Category I test) procedure verified proper reactor core performance by obtaining incore flux maps, core thermocouple maps, and analyzing reactor core data. This test verified that the core performance parameters of Heat Flux Hot Channel Factor FQ(Z), Nuclear Enthalpy Rise Hot Channel Factor (FΔH), Quadrant Power Tilt Ratio (QPTR) and Departure from Nucleate Boiling (DNB) meet the requirements of Technical Specifications. This test was performed at 30, 50, 75, 90 and 100% power levels.

NRC inspectors witnessed the performance of the Incore Flux Mapping at 6 distinct power levels. Incore flux mapping was performed to collect data to determine the Heat Flux Hot Channel Factor and the Nuclear Enthalpy Rise Hot Channel Factor. Other required data, such as the Quadrant Power Tilt Ratio, were calculated by the plant process computer using input from the nuclear instrumentation. DNB parameters of Tavg and pressurizer pressure were transcribed from the Technical Specification Operator Logs. RCS flow was calculated by performing routine reactor engineering surveillance procedures.

The inspectors verified that data was collected in accordance with ST-29. No adverse conditions were identified in the data collection sections of this test.

4.4 ST-30, Power Coefficient Measurement

The Power Coefficient Measurement Test (Category I test) was performed to measure the power coefficient verification factors at various reactor powers. This test was performed at the 30, 50, 75 and 100% power plateaus. Three generator load swings of approximately 40 MWe were conducted at each test plateau. Core delta-T and Tavg were recorded before and after each load swing.

Since the Doppler coefficient cannot be measured directly, the Doppler coefficient is inferred by calculating the Doppler-only power coefficient verification factor. The Doppler-only power coefficient verification factor is the ratio of the change in core average temperature to the change in core power, due to the Doppler effect.

The core power change is inferred using the change in the core delta-T.

NRC inspectors witnessed the conduct of ST-30 at all test plateaus. The licensee conducted this test in accordance with the test procedure. No discrepancies were identified by the NRC inspectors during the performance of this test.

4.5 ST-33, Shutdown From Outside the Control Room

The plant demonstrated the ability to trip the reactor from a location external to the control room (Category I test), to transfer operations to the Remote Safe Shutdown (RSS) facilities, and to control the plant to achieve stable hot standby conditions. This test was performed on June 16, 1990 for a duration of 30 minutes between 11:15 and 11:45 a.m. The test was witnessed by three inspectors who found all aspects of the test satisfactory.

An operating crew was retained in the control room to observe and monitor plant status. To initiate the test, the reactor was tripped from approximately 20% power from the vital switchgear area. The reactor trip also tripped the turbine. The initial transient did not result in an automatic Emergency Feedwater (EHW) actuation. However, the steam-driven EFW pump was manually started from the RSS panels. The motor-driven EFW pump was never required and was not started. The Atmospheric Steam Dump Valves (ASDVs) were not required until 25 minutes after the trip, and then only minimal jogging of the ASDVs was required.

The control room crew did not prompt the RSS crew on any aspect of plant control. There were no equipment failures that required additional operator actions. Transfer of control back to the control room was completed to end the test. The inspectors concluded that this test was satisfactorily performed.

4.6 Category II Tests (ST-23, ST-24, ST-25, ST-34, ST-35 and ST-43)

While Inspection Manual Chapter 2514 does not require that all Category II tests be witnessed, the inspectors witnessed all Category II tests as stated in the PATP inspection plan (Attachment B, page 5 of 9).

ST-23, Test witnessing results are documented in NRC Inspection Report 50-443/90-81.

ST-24, Automatic Reactor Control, successfully demonstrated the capability of the reactor control system to maintain the reactor coolant average temperature within acceptable limits. This test was performed at the 30% power test plateau by varying RCS Tavg from the Tref setpoint, placing the control system in automatic and verifying its ability t[illegible]n RCS Tavg to the reference value.

ST-25, Automatic Steam Generator Level Control, demonstrated the stability of the automatic steam generator level control system following simulated transients. This test also verified the operation of the main feed pump control system. The test was performed at a number of test plateaus by simulating steam generator level transients and verifying proper level control. The operability of the main feed pump control system was verified by manipulation of the controllers and by simulating selected input signals.

ST-34, Load Swing Test, was performed at the 30%, 50%, 75% and 100% power plateaus. At each test plateau, the turbine generator output was changed to achieve approximately a 10% load decrease (and then increase) while verifying that the plant responded properly. The inspectors also verified that during these transients, no trips or safety injections occurred. The test successfully demonstrated the plant's response including automatic control system performance to 10% step load changes.

ST-35, Large Load Reduction, successfully demonstrated that the plant automatic control systems responded properly to a 50% load reduction. This test was performed from steady conditions at the 75% and 100% power plateaus. The test was performed by reducing the turbine generator output to achieve an approximate 50% load reduction. The inspectors observed that the licensee performed the test according to test procedures.

ST-43, Process Computer, was performed at the 30%, 50%, 75% and 100% power plateaus. The test was performed by comparing the computer outputs for various plant parameters with the values indicated by plant process instrumentation and verifying that these values agree. The inspectors verified that the licensee adequately confirmed that these values were in agreement with each other.

5.0 Test Results Evaluation (Inspection Module 72301)

Inspection and Enforcement Manual Chapter 2514, "Light Water Reactor Inspection Program Startup Testing Phase" (IM 2514), provides specific guidance for reviewing PATP test results. As required by IM 2514, all Category I test results were evaluated (See Attachment B, page 3 of 9) and details of these evaluations are described below.

Half of the Category II procedure results are required to be evaluated. The remaining Category II test procedure results are to be reviewed to ascertain that evaluations made by the licensee indicate satisfactory results. All Category II test results were evaluated (See Attachment B, page 6 of 9). Description of half the Category II test results evaluations are documented below. All Category III test results are to be reviewed to ascertain that evaluations made by the licensee indicate satisfactory results. This review was conducted for all Category III test results (See Attachment B, page 9 of 9).

The inspectors performed independent examinations of PATP test results packages to:

- Determine that information was appropriately documented and evaluated by the licensee.
- Determine that the licensee's technical conclusions were valid.
- Ascertain that test changes were properly incorporated and did not reduce the intent of any test objectives.
- Verify that all acceptance criteria were either met or test exceptions written, resolved, documented, and closed out.
- Verify that the licensee's process of review and approval of test results was in accordance with the Power Ascension Test Program procedure, SM 8.1, Rev. 2.

The inspectors' noted some administrative errors, which were satisfactorily resolved by the licensee. The inspectors concluded that test results were appropriately evaluated and documented by the licensee.

5.1 ST-38, Unit Trip from 100% and ST-22, Natural Circulation

The inspectors reviewed the test results package for ST-38. All acceptance criteria were met. One test change was written during the performance of this test. There was no test exception generated. The inspectors verified that:

- The test change was properly incorporated and did not change the intent of the test objective.
- Data sheets were properly completed.
- The test package was properly reviewed and evaluated.
- The licensee documented their review and acceptance of the package.

The inspectors found no discrepancies with this results package.

The Natural Circulation Test (ST-22) was conducted in conjunction with ST-38. All test acceptance criteria were met. One test change was incorporated into the procedure. The inspector verified that this change was properly incorporated and did not alter the intent of the test objective. There was no test exception written. After stable natural circulation was achieved, the test lasted a period of 30 minutes before restoration began. During the test, the minimum subcooling margin recorded was 74.4 degrees F, which was well above the test termination criteria of 20 degrees F.

The inspectors reviewed the test results package and concluded that the licensee had adequat ly reviewed, evaluated and documented their review of the results package.

5.2 ST-39, Loss of Offsite Power (Loop) Test

During the conduct of this test, the licensee incorporated five test changes. These changes did not alter or reduce the intent of the test objectives. All changes were properly processed and incorporated into the test procedure.

Two problems occurred during the performance of this test:

- The pressurizer group A backup heaters could not be manually re-energized from the MCB following Emergency Power Sequencer (EPS) reset.

- The Main Plant Computer System (MPCS) prime host failed over to the backup host.

The first problem was unexpected, while the licensee had anticipated the second. To resolve the first issue, the licensee generated a Work Request (#90W004109) to troubleshoot the backup heaters control circuit. A minor modification (MMOD #90-641) was issued to correct the cable termination discrepancy that was found in the control circuit. The licensee had anticipated the MPCS failure and made other provisions for obtaining the EPS activation time. A test exception was written to clarify using this method. The inspectors verified that the resolution to this exception was acceptable. All test acceptance criteria were met. Administrative concerns raised by the inspectors following the review of the results package were adequately resolved by the licensee.

The inspectors concluded that the results of this test had been properly documented and evaluated by the licensee.

5.3 ST-29, Core Performance Evaluation

Test results of core performance parameters were reviewed by the NRC for all test power plateaus. A summary of the results are provided in the table below:

Test Plateau	Fxy(Meas)	Fxy(Limit)	FΔH	FΔH(Limit)	QPTR	QPTR(Limit)
30%	1.60	1.76	1.45	1.69	1.10	N/A
50%	1.57	1.71	1.43	1.65	1.10	N/A
75%	1.558	1.62	1.3896	1.56	1.0067	1.02
90%	1.5648	1.5810	1.3961	1.5198	1.0105	1.02
100%	1.5717	1.55	1.4036	1.49	1.0094	1.02

Departure from Nucleate Boiling (DNB) parameters for RCS flow rate, Tavg, and pressurizer pressure were also measured and were within Technical Specification limits.

As seen in the above table, the measured Fxy exceeded the Technical Specification limit at 100% power. At all power plateaus, the Rated Thermal Power (RTP) Fxy of 1.55 was exceeded. Technical Specifications requires that within 24 hours after exceeding by 20% of RTP or greater, an additional power distribution map shall be taken and Fxy determined. This is in addition to the data taken prior to the power increase. This specification required the licensee to take an additional power distribution map, which was taken at 65% power (TS 4.2.2.2.d).

The 65% power distribution map also had an Fxy measured greater than the Fxy RTP. To comply with Technical Specifications, reactor power was increased to 75% and an additional scheduled power distribution map was taken. All Technical Specification surveillance requirements related to Fxy were satisfied during power escalation. At 100% power Fxy measured again exceeded Fxy RTP. Technical Specification 4.2.2.2.g requires the licensee to perform the following "...the effects of Fxy on FQ(Z) shall be evaluated to determine if FQ(Z) is within its limits." The licensee initially interpreted this to mean that the measured FQ should be verified to be below the FQ limit provided in Technical Specification 3.2.2. The licensee performed this evaluation and found the measured FQ was well below the Technical Specification limits for FQ. However, upon further review by the NRC, it was determined that "evaluated" in the above specification means that FQ must be evaluated for all "normal operating conditions" as described in WCAP-8385. Based on this information, the licensee performed calculations to ascertain that the FQ will be below the Technical Specification limits during "normal operating conditions." These calculations indicated that the FQ would remain below the Technical Specifications limits during "normal operating conditions." Therefore no further Technical Specification action was required.

All core performance evaluation results were evaluated by the inspectors and determined to be acceptable. The inspectors concluded that the measured parameters satisfied Technical Specification Surveillance requirements.

5.4 ST-30, Power Coefficient Measurement

The FSAR acceptance criterion for the power coefficient measurement is that the measured power coefficient verification factor shall be within + or -.5 degrees F/% of the predicted power coefficient verification factor. The predicted power coefficient verification factors were derived from information supplied in the Westinghouse Nuclear Design Report. The licensee used a Lotus spreadsheet to perform the numerous calculations needed to determine the power coefficient verification factors. The spreadsheet was reviewed by the NRC and tested by the licensee to verify its accuracy prior to use. Using the computer to perform calculation was a positive effort by the licensee to eliminate mathematical errors and allowed immediate evaluation of test results.

The difference between the average measured power coefficient verification factor and the predicted value was less than + or -.5 degrees F/% for all test plateaus. The measured and predicted power coefficient verification factors for each test plateau are provided below:

Test Plateau	Doppler Power Coefficient Verification Factor(°F/%)		
	Measured	Predicted	Difference
30	2.6048	2.8525	.2478
50	2.0275	1.8544	.1732
75	1.2875	1.2990	.0116
100	0.9456	1.0578	.1121

5.5 ST-33, Shutdown From Outside the Control Room

This test successfully demonstrated that the reactor can be shutdown and maintained in HOT STANDBY from outside the control room using a shift crew containing the minimum number of personnel required by Technical Specification Table 6.2-1. The test was performed from a reactor power level of 20%. All test acceptance criteria were met and no test exceptions were written. During the course of the test, four test changes were written. The inspectors verified that all test changes were properly incorporated into the test procedure and did not reduce safety margins or alter the intent of the test objective. The inspectors identified no discrepancies with the test results package. The inspectors determined that the test results were appropriately evaluated and documented by the licensee.

5.6 ST-25, Steam Generator Automatic Level Control

This test demonstrated the stability of the Automatic Steam Generator Level Control System following transients. The test was performed at various power levels (5%, 30%, 50%, 75% and 100%). Twelve test changes were incorporated into the test procedure during the conduct of this test. The test changes did not alter or reduce the intent of the test objective.

Two Test Exceptions were written. Both exceptions were adequately resolved by the licensee. Test Exception number 2 addressed the "apparent" failure to meet one of the Acceptance Criteria. The criterion specified that at the 100% plateau level, the main feedwater regulating valve stem position stabilize at less than 85% open. During the test, regulating valve FW-FCV-540 indicated 85% open. The licensee determined that the actual valve position was 75% open when it indicated 85%. A Work Request (# WR 90W3920) was written to correct this discrepancy (indicated versus actual valve position).

The inspectors verified that procedure changes were properly incorporated into the test procedure and that the licensee adequately evaluated and documented the results of this test.

5.7 ST-34, Load Swing

This test was performed at the 30%, 50%, 75% and 100% power plateaus. The test demonstrated proper plant transient response and proper automatic control system performance for a 10% step load change. At each test plateau, the 10% load change (first a 10% decrease, then a 10% increase) was induced by changing the turbine generator output. The inspectors verified that test changes written were properly incorporated and did not alter the intent of the test objective.

During the 100% power plateau testing, two Test Exceptions were written. One exception addressed the issue of the "B" steam generator level controller having to be placed in MANUAL during the load decrease. The other exception resulted when Tavg did not return to within 1 degree F of its initial value following the load swing. Tavg stabilized at approximately 3 degrees F below Tref. These exceptions were evaluated and resolved by the licensee. The inspectors concluded that the results of this test were adequately evaluated and documented.

5.8 ST-35, Large Load Reduction

This test successfully demonstrated the ability of the plant to withstand a load reduction of approximately 50% RTP without a plant trip or manual intervention by the operators. This test was successfully performed at the 75% and 100% power plateaus. All acceptance criteria were satisfied. No Test Exceptions were written at the 75% test plateau. A Test Change was written during the 100% plateau testing. This change did not reduce the intent of any test objective and the change was properly incorporated into the test procedure. The inspectors identified no discrepancies with the results of this test.

6.0 Unplanned Reactor Trips

6.1 Unplanned Reactor Trip of June 20, 1990

On June 20, 1990, while at 30% power, an unplanned reactor trip occurred at 4:39 p.m. This trip was caused by a turbine trip. The turbine trip was initiated by a main generator stator ground fault relay (64/TG-1(100%)) actuation. This initiating event, logged as "Generator Neutral Volts High" by the plant computer, caused the main generator breaker lockout relay (86-GP/TG-1) to pick up and initiate the turbine generator trip. The stator ground fault relay operates on the third harmonic voltage for the detection of faults in the 5% of the windings nearest the neutral connection.

Following the reactor trip, the shift crew responded appropriately and, in accordance with the directions of emergency procedures, brought the plant to a stable condition in hot standby. All control rods fully inserted in the core and a safety injection did not occur. The Emergency Feedwater System (EFW) started to supply water to the steam generators. An automatic isolation of the "A" steam generator occurred. This isolation feature occurs for only the first steam generator with EFW system flow greater than 425 gpm. The licensee set up an event evaluation team to evaluate the reactor trip. The licensee's root cause analysis determined the cause of the incident and resolution for the EFW flow isolation. A minor modification (MMod. No.90-619) was implemented to change the setpoint for EFW flow to steam generator isolation. This setpoint was changed from 425 gpm to 525 gpm. The inspectors found no deficiencies with this action. No safety or licensing conditions were degraded as a result of this modification.

A design application and analysis of the 64/TG-1 (100%) relay was performed but was not conclusive. The licensee, with the concurrence of the electric generator supplier, therefore, decided to remove the trip function of the 64/72N section of the relay and connect temporary monitoring equipment to it. This temporary modification (TMOD 90-0021) removed the 5% trip of the 100% ground relay 64/TG-1 while leaving the relay still capable of tripping the generator on high ground fault current. Additional data was collected during testing so that further analysis and resolution could be performed by the licensee and the relay supplier.

6.2 Unplanned Reactor Trip of July 5, 1990

On July 5, 1990 at 4:29 p.m., the reactor tripped from 75% power. The plant had been experiencing intermittent Electro-Hydraulic Controller (EHC) pressure low annunciator alarms during the afternoon. Also several steam generator oscillations required the operators to place level control in MANUAL. At that time, it was not known whether the oscillations had any relationship to the EHC troubles. Review of the annunciator log revealed that at least once before the trip, an EHC Pressure Low RPS channel trip occurred. Several times before the

trip, the EHC channels I and III pressure low annunciator alarms had been cycling in and out. The shift knew that the EHC pressure transmitters were vibrating. At 4:29 p.m. the EHC bistables started blinking, then the plant tripped. Indication was that the reactor tripped first and in turn tripped the turbine. The shift crew took immediate control and all nonessential personnel moved away from the control boards. All control rods fully inserted in the core and there was no safety injection. The EFW started to supply water to the steam generators. The control room operators brought the plant to a stable condition in Mode 3. The notifications were made and a team leader was quickly chosen for the Event Evaluation Team.

The licensee was unable to reset the feedwater isolation signal after the trip. They requested the circuitry for the feedwater isolation be checked to determine the problem. Sometime later, it was determined through this check that the steam generators reached a Hi-Hi level after the trip. Review of the annunciator log verified this finding. It wasn't obvious that the shift crew consciously reviewed the inputs for the feedwater isolation reset and verified the problem through control room recorders and/or annunciator logs. The operators appeared to be concentrating on the trip and probably relied on others to find the cause (there were other SROs in the control room). However, the cause wasn't identified until the circuitry was checked.

Once it was discovered and knowing it could be cleared if the reactor trip breakers were closed, the licensee decided to wait until the steam generators reached 25% on the narrow range before they momentarily closed the reactor trip breakers to allow the reset. Other than this reset question, the shift crew had adequate control of the situation and performed their activities in a safe and orderly manner.

The trip was initiated by the EHC low pressure switches when 2 of these 3 switches actuated erroneously due to turbine stop valves vibrations. These switches, which are mounted on 3 of the 4 turbine stop valves, initiate a reactor trip when a low EHC system pressure (setpoint of 500 psig) is sensed. The licensee generated a Station Information Report (SIR) number 90-049 to track the evaluation and ensuing recommendations for this trip. The licensee believes that the trip could not have been avoided even though the control room had been receiving erratic EHC alarms prior to the trip occurring. Being aware of the history of false computer alarms from the SSPS demultiplexer, the licensee had initiated actions which was thought to be appropriate to determine the cause of the erratic alarms. The EHC system engineer had been contacted and had confirmed that there was no low EHC pressure condition. The I&C department had also been contacted to troubleshoot for the cause of alarms.

The licensee's corrective action was to relocate the EHC low pressure switches from the stop valves to mounting plates welded to turbine building floor support beams. A minor modification (Mod. No. 90-626) was issued to perform this relocation. The modification eliminated the possibility of the switches being erroneously actuated again because of turbine stop valves vibrations.

On July 7, 1990, after successfully relocating and testing the EHC pressure switches, the plant entered into Mode 1 and resumed Power Ascension testing. The inspectors reviewed the licensee's evaluation and actions taken following the trip and concluded that, the licensee acted adequately.

7.0 Assessments

7.1 Power Ascension Test Program Test Group

Test personnel were knowledgeable of test activities and program requirements. Tests were conducted in accordance with approved procedures. Test changes were properly incorporated. Test evolutions were performed conservatively and were monitored by QC, QA, a Self-Assessment Team (SAT), and an NQA Audit Team. The test personnel were responsive to the queries made by licensee oversight teams as well as those made by the NRC inspectors.

During test performances, Test Exceptions were properly identified and adequately resolved.

Test results were reported, verified and promptly analyzed. Pre-test briefings were attended by involved test and operations personnel and were observed to be performed adequately. Opportunities for discussions and comments on each test were provided at these briefings.

The licensee's reactions to problems identified during testing were effective. Work requests were generated in a timely manner to troubleshoot and correct identified problems. The PATP was viewed as having exemplary strengths in the following areas:

- Pre-test Training Program (classroom, simulator, briefings).
- Pre-test briefings.
- Test Monitoring by independent organizations (QC, QA, NQA Audit Team, SAT).

Management involvement with and support for the PATP were evident. Increased staffing levels were accomplished when necessary e.g., when large number of data recorders, surveyors, etc. were required. The program manager and his supporting cast of managers and supervisors

participated in various test activities, such as pre-test briefings, training activities, and being present at test locations during testing. Management's "hands-on" approach to this program afforded good communication, fast resolution of problems, and overall, a safe and successful completion of the test program.

7.2 Operations

Control room activities were conducted professionally, in a well controlled manner, by knowledgeable operations personnel. Operators were observed to be attentive and communicative. It appeared that they were well aware of ongoing maintenance activities in the plant. Operator competence was evident during the day-to-day conduct of plant operations evolutions such as shift turnovers. Operations management involvement in ongoing activities was evident, management representatives observed most major plant evolutions. This appeared to have a positive effect on the attitudes and morale of the test and operations personnel.

Operations personnel were active participants in Pre-test briefings. They communicated well and discussed test procedures with test personnel. During shift turnovers, good communication existed between the shift crews. However, a conscious effort to walkdown control panels together was not always present.

The inspectors were able to observe the actions of the operators during unplanned transients on June 20, 1990 and on July 5, 1990, when the only unplanned reactor trips occurred. The operators performed well during the recovery from the plant trips. The entire crew from shift superintendents to operators, reacted properly and correctly. Procedures were adhered to and the plant was controlled safely. Timely briefings were provided to management and NRC inspectors. Overall, operations performance was viewed as excellent during this period.

7.3 Maintenance

During this period, the inspectors observed several corrective maintenance activities. While neither of these activities involved safety-related equipment, they presented good situations to observe the licensee's maintenance practices.

On one occasion, a pipe elbow and a reducer in the 6-inch section of the heater drain tank spill line (just downstream of valve LVL1583) were removed and replaced. These actions followed the erroneous results of an Ultrasonic Test (UT) performed earlier on the pipe elbow. The test results had shown that the elbow was eroded to a wall thickness of approximately 3 mils in some areas. After removal, the elbow was found uneroded. Documentation of the final disposition of this issue is provided in NRC Inspection Report 50-443/90-15.

On another occasion, an incorrect limit switch (open instead of closed) was installed on a steam dump valve. This was not identified until the work was almost complete. However, it was detected and corrected before the valve was returned to service.

The inspector questioned the licensee's priority classification (Priority 3 versus Priority 2) of an outstanding work order for repairs related to EFW check valve MS-V96 banging. While the licensee was responsive to the NRC concern, it was noted that, degradation of a safety-related component continued for almost 2 weeks (May 25 - June 7) before significant corrective actions were taken to stop the MS-V96 check valve banging. It was recognized that the licensee had instituted some corrective action in the 2-week period and that further corrective actions were planned to make an improved, longer term repair. However, it appeared that NRC involvement in this issue was a major factor in escalating the work priority to effect the cessation of the MS-V96 check valve banging. Other maintenance activities observed were performed adequately and timely.

7.4 Training

Power Ascension Test Program training was conducted in accordance with Station Management Manual Procedure SM 8.1, section 4.4. General PATP and simulator training for selected Startup Test Procedures were conducted for operations, testing, and QA/QC personnel. Crew specific training was conducted, just prior to test performance, for five operationally complex test procedures. NRC inspectors witnessed crew specific training sessions for the following startup tests.

ST-22, Natural Circulation Test
ST-33, Shutdown from Outside the Control Room
ST-35, Large Load Reduction Test
ST-38, Unit Trip from 100% Power
ST-39, Loss of Offsite Power Test

Crew specific training included training of operators, test personnel, QC personnel, Independent Review Team members and the Assistant Operations Manager. The training included classroom, simulator, and debrief training. The classroom portion covered the FSAR requirements, step-by-step review of the procedure, and review of other plant test performances and concerns. The simulator training consisted of a normal test performance and a test performance with an unexpected event. The debrief training provided an opportunity for operations and power ascension test management to discuss and resolve issues evolved at the training session.

Procedural changes were identified during the training sessions by crew members. Coordination of the test between different departments was enhanced. The simulator training was conducted in a realistic environment. During training on the simulator for a large load reduction from 75% power, the simulator instructors determined the simulated cooldown rate of the primary was half the expected 133 degrees F per minute rate. The computer model was modified and the test crew was retrained on the simulator prior the test.

The inspectors concluded that the training was of high quality and thorough. The effectiveness of training sessions was demonstrated by the well-coordinated tests which were successfully completed in a professional and controlled manner.

7.5 Chemistry

The inspectors observed that the chemistry program contained adequate administrative controls and oversight to ensure that radioactive waste releases are controlled and monitored. Liquid and gas batch releases 90-109, 90-110, 90-111, 90-112, 90-113, and 90-115, all completed in early July of 1990, were reviewed and found adequately performed and well within Technical Specifications limits.

8.0 Conclusion

The PATP was performed in accordance with the requirements and conditions for the facility license, FSAR, and Regulatory Guides for the power ascension testing. The PATP was conducted in a safe and controlled manner. The extensive improvements made by the licensee, following the Low Power Test Program, in the areas of test procedure enhancements, training, and overall program conduct resulted in a minimum number of unanticipated transients and only two unscheduled automatic reactor shutdowns.

Individual assessment by 22 NRC inspectors, totalling approximately 1500 hours of direct inspection of PATP activities, resulted in no identified significant safety concerns. This demonstrates the quality of effort made by the operating and test personnel in conducting the PATP. Based on the tests witnessed, test results evaluated, interviews conducted, and general activities observed, the inspectors concluded that the power ascension tests were performed in a safe and controlled manner by knowledgeable operations and startup staff. Also, the inspection team concluded that the Power Ascension test Program at Seabrook Station was conducted in accordance with procedures and administrative requirements.

The NRC inspection of PATP activities met or exceeded all inspection requirements outlined in the IM 2514 inspection program. At the end of the inspection coverage, not all the test results for the 100% power plateau had been approved by the Station Operations Review Committee (SORC). The

results had been reviewed by a number of licensee personnel. The result packages were evaluated by the NRC and the test data indicated that acceptance criteria had either been met or appropriate test exceptions has been written to resolve the issue for these tests. Based on these evaluations, further NRC review of the test results following SORC approval is not necessary, and the test results evaluation for the PATP is complete.

9.0 Exit Meetings

The inspectors met with licensee management on a weekly basis to discuss findings of this inspection. The final exit meeting was conducted on August 31, 1990 (See Attachment D for persons present during August 31, 1990 exit meeting). At no time during this inspection did the inspectors provide written material to the licensee. The licensee did not identify that the inspectors were provided any proprietary information during this inspection.

ATTACHMENT A

PARTICIPATING NRC INSPECTORS

John Bradfute, NRR
Rich Barkley, DRP/RI
Matt Chiramal, AEOD/Acting RI
Joe D'Antonio, DRS/RI
Jenifer Dixon, DRS/RI
Pete Drysdale, DRS/RI
Noel Dudley, SRI, Seabrook
Rich Freudenberger, DRP/RI
Roy Fuhrmeister, RI, Seabrook
Larry Kopp, NRR
Bill Long, NRR
Jim Miller, NRR
Dan Moy, DRS/RI
Bill Oliveira, DRS/RI
Neil Perry, DRP/RI
Chet Poslusny, NRR
Len Prividy, DRS/RI
Bob Pulsifer, NRR
Pete Sena, DRP/RI
Scott Stewart, DRP/RI
Don Taylor, DRS/RI
James Trapp, DRS/RI (Team Leader)
Jimi Yerokun, DRS/RI

ATTACHMENT B

SEABROOK POWER ASCENSION PROGRAM
NRC INSPECTION PLAN

CATEGORY I TESTS
PROCEDURE REVIEW

Licensee Procedure	Group A/B	Required Yes/No	Inspection Module	Responsible Inspector	Date Complete
ST-22 Nat. Circ.	A	Yes	72576	D'Antonio	3-17-90
ST-29 Core Perf.	A	Yes	72578	Trapp	3-6-90
ST-30 Pwr.Coeff.	B	No	72576	Trapp	4-2-90
ST-33	B	Yes*	72583	D'Antonio	3-20-90
S/D Out.CR				Trapp	3-19-90
ST-38 Unit Trip	A	Yes	72580	Yerokun	3-25-90
ST-9	A	Yes	72582	D'Antonio	3-21-90
LOO				Trapp	3-28-90

* Denotes Group B Test Required by NRC Memo Kane to Murley Dtd. 4/20/87

Note: Inspection Requirement per IM2514; Ascertain that approved procedures exits for all tests. Review of test procedures, test witnessing, and evaluation of test results shall be done for either Group A or Group B, Category I tests. In addition, enhanced test observation and test data review are required for power ascension tests. that evaluations made by the remaining tests indicate satisfactory results.

Inspection Plan; All Category I, Group A tests procedures including Group B test ST-33, will be reviewed.

Attachment B

SEABROOK POWER ASCENSION PROGRAM
NRC INSPECTION PLAN

CATEGORY I TESTS
TEST WITNESSING

Licensee Procedure	Group A/B	Required Yes/No	Inspection Module	Responsible Inspector	Date Complete
ST-22 Nat. Circ.	A	Yes	72302	Yerokun	7/29/90
ST-29 Core Perf.	A	Yes	72302	Several Inspectors	7/90
ST-30 Pwr.Coeff.	B	No	72302	Drysdale Trapp	6/90 6/90
ST-33 S/D Out.CR	B	Yes*	72302	Trapp	6/16/90
ST-38 Unit Trip	A	Yes	72302	Yerokun	7/29/90
ST-39 LOUP	A	Yes	72302	Yerokun	8/1/90

* Denotes Group B Test Required by NRC Memo Kane to Murley Dtd. 4/20/87

Note: Inspection Requirement per IM2514; Ascertain that approved procedures exits for all tests. Review of test procedures, test witnessing, and evaluation of test results shall be done for either Group A or Group B, Category I tests. In addition, enhanced test observation and test data review are required for power ascension tests. that evaluations made by the remaining tests indicate satisfactory results.

Inspection Plan; All Category I, Group A tests including Group B test ST-33, will be witnessed during test performance.

Attachment B

SEABROOK POWER ASCENSION PROGRAM
NRC INSPECTION PLAN

CATEGORY I TESTS
RESULTS EVALUATION

Licensee Procedure	Group A/B	Required Yes/No	Inspection Module	Responsible Inspector	Date Complete
ST-22 Nat. Circ.	A	Yes	72301	Yerokun	8/11/90
ST-29 Core Perf.	A	Yes	72301	Trapp Yerokun	7/90 8/9/90
ST-30 Pwr.Coeff.	B	No	72301	D'Antonio	8/8/90
ST-33 S/D Out.CR	B	Yes*	72301	Yerokun	6/22/90
ST-38 Unit Trip	A	Yes	72301	D'Antonio	8/8/90
ST-39 LOOP	A	Yes	72301	Yerokun	8/28/90

* Denotes Group B Test Required by NRC Memo Kane to Murley Dtd. 4/20/87

Note: Inspection Requirement per IM2514; Ascertain that approved procedures exits for all tests. Review of test procedures, test witnessing, and evaluation of test results shall be done for either Group A or Group B, Category I tests. In addition, enhanced test observation and test data review are required for power ascension tests. that evaluations made by the remaining tests indicate satisfactory results.

Inspection Plan; All Category I, Group A test results including Group B test ST-33, will be evaluated.

Attachment B

SEABROOK POWER ASCENSION PROGRAM
NRC INSPECTION PLAN

CATEGORY II TESTS
PROCEDURE REVIEW

Licensee Procedure	Selected Yes/No	Inspection Module	Responsible Inspector	Date Complete
ST-23 Stm. Dump	Yes	72300	Yerokun	3-6-90
ST-24 Auto Rx.Cnt	Yes	72300	Hughes	3-6-90
ST-25 S/G Lvl Cnt	Yes	72300	Hughes	3-7-90
ST-34 Load Swing	Yes	72300	Yerokun	3-26-90
ST-35 Load Reduct.	Yes	72300	Trapp	2-14-90
ST-43 Proc. Compt.	Yes	72300	D'Antonio	3-20-90

Note: Inspection Requirement per IM2514; Ascertain that approved procedures exists for all tests. Evaluate the results of 50% of the tests and determine that evaluations made by the remaining tests indicate satisfactory results.

Inspection Plan; Review Category II procedures.

Attachment B

SEABROOK POWER ASCENSION PROGRAM
NRC INSPECTION PLAN

CATEGORY II TESTS
TEST WITNESSING

Licensee Procedure	Selected Yes/No	Inspection Module	Responsible Inspector	Date Complete
ST-23 Stm. Dump	Yes	72302	Yerokun Oliveira	3-25-90
ST-24 Auto Rx.Cnt	Yes	72302	Several Inspectors	6/90
ST-25 S/G Lvl Cnt	Yes	72302	Yerokun Oliveira	6/90
ST-34 Load Swing	Yes	72302	Several Inspectors	7/90
ST-35 Load Reduct.	Yes	72302	Oliveira	7/12/90
ST-43 Proc. Compt.	Yes	72302	Prividy Moy	6/90 6/90

Note: Inspection Requirement per IM2514; Ascertain that approved procedures exists for all tests. Evaluate the results of 50% of the tests and determine that evaluations made by the remaining tests indicate satisfactory results.

Inspection Plan; Test witnessing is not specifically required for category II tests. The inspection plan is to witness 100% of the category II tests, since inspectors will be available following other aspects of the power ascension program.

Attachment B

SEABROOK POWER ASCENSION PROGRAM
NRC INSPECTION PLAN

CATEGORY II TESTS
TEST RESULTS EVALUATION

Licensee Procedure	Required Yes/No	Evaluate Yes/No	Inspection Module	Responsible Inspector	Date Complete
ST-23 Stm. Dump	Yes	Yes	72301	Yerokun	3-27-90
ST-24 Auto Rx.Cnt	No	Yes	72301	Trapp	6/90
ST-25	Yes	Yes	72301	Yerokun	6/20/90
S/G Lvl Cnt				Trapp	6/90
ST-34	No	Yes	72301	Oliveira	
Load Swing				Yerokun	8/9/90
ST-35	Yes	Yes	72301	Yerokun	7/29/90
Load Reduct				Pulsifer	8/7/90
ST-43	No	Yes	72301	Moy	6/90
Proc. Compt					

Note: Inspection Requirement per IM2514; Ascertain that approved procedures exists for all tests. Evaluate the results of 50% of the tests and determine that evaluations made by the remaining tests indicate satisfactory results.

Inspection Plan; Test results evaluation will be performed for the three tests listed as required (IE 50% of the category II tests). All the category II tests results will be evaluated. This meets the requirement for category II tests stated above.

Attachment B

SEABROOK POWER ASCENSION PROGRAM
NRC INSPECTION PLAN

CATEGORY III TESTS
PROCEDURE REVIEW

Licensee Procedure	Required Yes/No	Proc. Exists Yes/No	Inspection Module	Responsible Inspector	Date Complete
ST-13 Align NI's	Yes	Yes	72300	Trapp	3-18-90
ST-14.1 Pr.Temp.Ins	Yes	Yes	72300	Trapp	3-18-90
ST-15 Setpt Verf	Yes	Yes	72300	Trapp	3-18-90
ST-26 Th.Pwr.Det	Yes	Yes	72300	Trapp	3-18-90
ST-27 Rx.Cnt.Sys	Yes	Yes	72300	Trapp	3-18-90
ST-28 Stm&FW Cal	Yes	Yes	72300	Trapp	3-18-90
ST-36 Ax.Flux Dif	Yes	Yes	72300	Trapp	3-18-90
ST-42 Water Chem	Yes	Yes	72300	Trapp	3-18-90
ST-44 Loose Part	Yes	Yes	72300	Trapp	3-18-90
ST-45 Effl. Mon	Yes	Yes	72300	Trapp	3-18-90
ST-46 Vent. Op.	Yes	Yes	72300	Trapp	3-18-90

Note: Inspection Requirement per IM2514; Ascertain that approved procedures exists and that evaluations made by the licensee indicate satisfactory test results.

Inspection Plan; Licensee Test Program will be reviewed to ascertain that procedures exist for these activities.

Attachment B

SEABROOK POWER ASCENSION PROGRAM
NRC INSPECTION PLAN

CATEGORY III TESTS
TEST WITNESSING

Licensee	Required Yes/No	Inspection Module	Responsible Inspector	Date Complete
ST-13 Align NI's	No	72302	Buhrmeister Oliveira	6/90 7/90
ST-14.1 Pr.Temp.Ins	No	72302	Moy Drysdale	6/90 6/90
ST-15 Setpt Verf	No	72302	N/A	N/A
ST-26 Th.Pwr.Det	No	72302	Moy Prividy	6/90 6/90
ST-27 Rx.Cnt.Sys	No	72302	Drysdale Oliveira	7/90 7/90
ST-28 Stm&FW Cal	No	72302	Several Inspectors	7/90
ST-36 Ax.Flux Dif	No	72302	Oliveira Perry	6/90 6/90
ST-42 Water Chem	No	72302	Several Inspectors	7/90
ST-44 Loose Part	No	72302	Taylor	6/90
ST-45 Effl. Mnt	No	72302	Oliveira Taylor	6/90 7/90
ST-46 Vent. Op.	No	72302	Several Inspectors	6/90

Note: Inspection Requirement per IM2514; Ascertain that approved procedures exists and that evaluations made by the licensee indicate satisfactory test results.

Inspection Plan; Licensee Test Program will be reviewed to ascertain that procedures exist for these activities. Witnessing on a sample basis of category III test performance will be conducted.

Attachment B

SEABROOK POWER ASCENSION PROGRAM
NRC INSPECTION PLAN

CATEGORY III TESTS
TEST RESULTS EVALUATION

Licensee Procedure	Required Yes/No	Results Sat. Yes/No	Inspection Module	Responsible Inspector	Date Complete
ST-13 Align NI's	Yes	Yes	72301	D'Antonio Yerokun	8/8/90 6/20/90
ST-14.1 Pr.Temp.Ins	Yes	Yes	72301	Oliveira Several Inspectors	7/90
ST-15 Setpt Verf	Yes	N/A	72301	N/A	N/A
ST-26 Th.Pwr.Det	Yes	Yes	72301	Several Inspectors	7/90
ST-27 Rx.Cnt.Sys	Yes	Yes	72301	Trapp	6/13/90
ST-28 Stm&FW Cal	Yes	Yes	72301	Oliveira Barkley	7/90 7/90
ST-36 Ax.Flux Dif	Yes	Yes	72301	Oliveira Trapp	6/90 6/18/90
ST-42 Water Chem	Yes	Yes	72301	Barkley Oliveira	7/90 7/90
ST-44 Loose Part	Yes	Yes	72301	Trapp	6/15/90
ST-45 Effl. Mnt	Yes	Yes	72301	Trapp	8/27/90
ST-46 Vent. Op.	Yes	Yes	72301	Trapp	7/90

Note: Inspection Requirement per IM2514; A certain that approved procedures exists and that evaluations made by the licensee indicate satisfactory test results.

Inspection Plan; Licensee Test Results Evaluations will be reviewed to assure satisfactory results.

ATTACHMENT C

CHRONOLOGY OF EVENTS
POWER ASCENSION TESTING
MAY 26 - AUGUST 31, 1990

DATE	EVENT
5-26	- Resumed NRC Power Ascension Test Program coverage. - Reactor criticality (Mode 2) achieved at 5:29 a.m.
5-28	- ST-48.1, Turbine Torsional Test, section 6.2 (30% plateau testing) completed. Test data analysis indicates that repairs to Turbine was successful.
6-04	- Turbine overspeed tests completed and test results found satisfactory and accepted by Turbine supplier.
6-06	- ST-26, Thermal Power Measurement and Setpoint Data Collection, for 30% plateau evaluated and found satisfactory. - Arcing observed through the plexiglass inspection cover on the B isophase Bus caused operators to reduce power to approximately 17% for repairs.
6-07	- 30% plateau testing in progress.
6-10	- St-24, Automatic Reactor Control, completed satisfactorily. - ST-34, Load Swing Test, completed for 30% plateau testing. - SORC meeting to approve results of 30% test plateau. Permission granted to proceed to 50% plateau.
6-11	- Reactor power at 50%. - Secondary water chemistry results indicate unacceptably high cation conductivity, chlorides, and sulfates causing a one day delay in testing activities.
6-12	- Performing tests at the 50% power plateau. Ongoing tests include: ST-26, Thermal Power Measurement and Setpoint Data Collection. ST-28, Calibration of Steam and Feedwater Control Systems. ST-42, Water Chemistry Control. ST-45, Process Effluent Radiation Monitoring System. ST-25, Automatic Steam Generator Level Control.
6-15	- Satisfactorily performed the 50% plateau portion of ST-34, Load Swing.
6-16	- Satisfactorily performed ST-33, Shutdown from Outside the Control Room.
6-17	- 50% power plateau testing completed.

6-18 - Primary Component Cooling Water (PCCW) check valve disassembled for repairs.

6-20 - SORC review and approval of 50% plateau tests results done.
- Management Oversite Committee (MOC) meeting held to discuss Tests results up to date.
- Approval for 75% plateau testing granted.
- Reactor Trip occurred. This trip caused by a Turbine Trip which was caused by a "Generator Neutral Volts High".

6-21 - Plant in Mode 3 while personnel are conducting a root cause analysis on the Reactor Trip. (see 6.1, Reactor Trip of 6/20/90)

6-26 - Plant back in Mode 1 to resume testing activities.

6-28 - Erratic Feedwater oscillations occurring.

6-29 - Performing 65% incore flux mapping due to Fxy limitations.

6-30 - Cracks detected in heater drain tank reducer between valves V105 and 4509.

7-01 - Reactor Power lowered below 10% and the main Turbine tripped to troubleshoot Secondary side oscillations that have been occurring.

7-02 - 75% Plateau Testing resumed.
- Generator Setback of approximately 440 Mwe occurred caused by control relays of the main transformer cooling fans.
- Ultrasonic Tests of pipes in the secondary side showed an elbow in the 6 inch section of the Heater Drain tank spill line with a wall thickness of approximately 3 mils.
- Reactor power reduced below 10% for pipe repairs.
- Temporary Loss of all offsite telephones occurred.

7-05 - 75% Plateau testing activities resumed.
- Reactor Trip occurred caused by the EHC Low Pressure Switches. (see 6.2, Reactor Trip of 7/05/90)

7-06 - Minor-Mod 90-626 to relocate EHC pressure switches being worked.

7-07 - Reactor criticality attained.

7-08 - 75% Plateau testing activities resumed.

7-10 - Several tests in progress :
ST-36, Axial Flux Difference Instrumentation Calibration.
ST-25, Thermal Power Measurement & Setpoint Data Collection
ST-29, Core Performance Evaluation.

7-11 - ST-34, Load Swing, performed satisfactorily.

7-12 - ST-30,Power Coefficient Measurement, performed satisfactorily.
- ST-35, Large Load Reduction performed satisfactorily.

7-14 - SORC approval of 75% Plateau Tests given and permission granted to proceed to next plateau (100% power).

7-15 - Reactor at 90% power for some tests and Data collection prior to proceeding to 100%.

7-21 - 100% Plateau testing activities in progress:
ST-25, Steam Generator Level Control
ST-43, Process Computer
ST-48, Turbine Generator Startup
ST-26, Thermal Power Measurement
ST-41, Radiation Survey
ST-42, Water Chemistry Control
ST-44, Loose Parts Monitoring
ST-45, Process Effluent Monitor
ST-46, Ventilation System Operation Test

7-26 - ST-30, Power Coefficient Measurement performed satisfactorily.
- ST-34, Load Swing Test performed satisfactorily.
- ST-35, Large Load Reduction performed satisfactorily.

7-29 - ST-38, Unit Trip From 100% Power, performed satisfactorily.
- ST-22, Natural Circulation Test, performed satisfactorily.

8-01 - ST-39, Loss of Offsite Power Test, performed satisfactorily

8-02 - Reactor back in Mode 1.

8-05 - Reactor in Mode 1 at 100% power.
- ST-40, NSSS Acceptance Test, (250 hr. warranty run) started at 5:00 p.m.

8-10 - List of outstanding NRC comments from test results reviews given to the licensee for resolution.

8-11 - Ended NRC 24-hr coverage of Seabrook's PATP.

8-31 - Final Exit Meeting held.

ATTAHCMENT D

Personnel Present at August 31, 1990 Exit Meeting

NHY Personnel:

R. Bergeron, Eng. Programs Mgr.
B. E. Beuchel, I&C Eng. Supr.
S. P. Buchwald, QA Supervisor
J. P. Cady Jr., ISEG Supr.
R. M. Cooney, Maint. Mgr.
D. Covill, NQG Surv. Supr.
B. L. Drawbridge, Exec. Dir. of Nucl. Prod.
W. A. DiProfio, Asst. Station Mgr.
P. Gurney, R. E. Dept. Supr.
G. A. Kann, Program Support Mgr.
R. L. Krohn, NRC Coordinator
W. Leland, Chem.& HP Mgr.
W. M. Matejek, NHY-SAT
J. M. Malone, OPS Admin. Supr.
V. J. Pascucci, QC Insp. Supr.
J. L. Peterson, Asst. Ops. Mgr.
R. J. Sherwin, P/S & Outage Mgr.
C. J. Vincent, Q.C. Dept. Supr.
L. A. Walsh, Mgr. of Ops. Support
J. Warnock, NQM
J. M. Vargas, Mgr. of Eng.

NRC Personnel:

N. Dudley, SRI Seabrook
J. Trapp, Sr. Reactor Eng.
J. Yerokun, Reactor Eng.