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NYN- 90167

September 1[illegible], 1990

United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

References: (a) Facility Operating License No. NPF-86, Docket No. 50-443

(b) NHY Letter NYN-90070, "Initial Startup Report" dated March [illegible], T. C. Feigenbaum to USNRC

(c) NHY Letter NYN-90126, "Supplement 1 to the Initial Startup [illegible] dated June 13, 1990, T. C. Feigenbaum to USNRC

Subject: Supplement 2 to the Initial Startup Report

Gentlemen:

In accordance with the requirements of Technical Specification 6.8.1.1 enclosed is Supplement 2 to the Initial Startup Report submitted via Reference (b) and supplemented via Reference (c). Supplement 2 to the Initial Startup Report covers the period from [illegible] 1990 through August 1990, during which the Power Ascension Test Program was completed on August 18, 1990.

This supplemental report provides a summary level description of the test results for each power level test plateau as test documentation is still being reviewed by the Station Operation Review Committee. A final detailed supplemental report (Supplement 3) will be submitted by September 30, 1990.

Should you have any questions regarding this report please contact Mr. James A. Peschel, Regulatory Compliance Manager at (603) 474-9521 extension 3772.

Very truly yours,

Ted C. Feigenbaum

Enclosure

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NEW HAMPSHIRE YANKEE

SEABROOK STATION

SUPPLEMENT 2

to

INITIAL STARTUP REPORT

to the

UNITED STATES

NUCLEAR REGULATORY COMMISSION

OPERATING LICENSE: NPF 86

NRC DOCKET NO. 50-443

For the Period

June, 1990

through

August, 1990

1.0 INTRODUCTION

The Initial Startup Report was submitted to the Nuclear Regulatory Commission in March, 1990 and covered startup activities through completion of low power physics testing (June 1989). Supplement 1 reported testing which took place in the interval from July 1989 through May 1990.

Testing from June, 1990 through August, 1990 completed the Power Ascension Test Program. ST-40, NSSS Acceptance Test, was completed on August 17, 1990, and the Startup Test Program was officially completed at 2400 hours, August 18, 1990.

Supplement 2 covers the three-month period of startup activity (June through August, 1990) from the submittal of Supplement 1. The remainder of the Power Ascension Test Program was completed in the three-month interval, however, the large number of tests conducted at the 30%, 50%, 75%, 90% and 100% power level test plateaus, and the requirement to complete final test packages and submit them for Station Operating Review Committee (SORC) review and approval, has impacted preparation of the final startup report material.

This document will summarize the tests and results at each power level test plateau and any problems encountered during the test sequences.

Supplement 3, the Initial Startup Report final document, will contain detailed descriptions and test data for each test.

2.0 SUMMARY OF TESTING AND RESULTS

The summary will consider individually each of the power level test plateaus in the test sequence: 30%, 50%, 75%, 90% and 100%. The final testing reported in Supplement 1 was the revised torsional response test, ST-48.1, conducted with General Electric support personnel, which verified that the undesirable resonance frequency found during the original performance of ST-48.1, had been corrected. On completion of the turbine repair, preparations began to escalate to the 30% power level test plateau.

The tests to be reported are:

ST-13,	Operational Alignment of Nuclear Instrumentation
ST-14.1,	Operational Alignment of the Process Temperature Instrumentation
ST-15,	Reactor Plant System Setpoint Verification
ST-22,	Natural Circulation Test
ST-24,	Automatic Reactor Control
ST-25,	Automatic Steam Generator Level Control
ST-26,	Thermal Power Measurement and Statepoint Data Collection
ST-27,	Startup Adjustments of Reactor Control System
ST-28,	Calibration of Steam and Feedwater Flow Instrumentation
ST-29,	Core Performance Evaluation
ST-30,	Power Coefficient Measurement
ST-33,	Shutdown from Outside the Control Room
ST-34,	Load Swing Test
ST-35,	Large Load Reduction
ST-36,	Axial Flux Difference Instrumentation Calibration
ST-37,	Steam Generator Moisture Carryover Measurement
ST-38.	Unit Trip from 100% Power
ST-39,	Loss of Offsite Power Test
ST-40,	NSSS Acceptance Test
ST-41,	Radiation Survey
ST-42,	Water Chemistry Control
ST-43,	Process Computer
ST-44,	Loose Parts Monitoring
ST-45,	Process Effluent Radiation Monitoring System
ST-46,	Ventilation System Operability Test
ST-48,	Turbine Generator Startup Test
*ST-49,	Circulating Water System Thermal-Hydraulic Test
ST-51,	Power Ascension Dynamic Vibration Test
ST-52,	Thermal Expansion
ST-56,	Piping Vibration Testing

* Test Deferred. Testing will be performed prior to operation of the circulating water system in the heat treatment mode.

2.1 Testing at the 30% Power Level Test Plateau

The test sequence at 30% included all, or portions of thirteen tests.

The PAT sequence required several tests in the 10% - 30% range of reactor power as part of the 30% power level test plateau. Turbine synchronization and overspeed testing (ST-48), and verification of automatic control by feedwater regulating valves (ST-25) were performed. Rework of the turbine overspeed trip required several days. After completion of the turbine generator qualification, power ascension to 30% proceeded.

As was true at each plateau, certain tests to verify/align instrumentation were carried out. The Nuclear Instrumentation System (ST-13), process temperature instrumentation (ST-14.1) and steam flow and feedwater flow instrumentation (ST-28) relied on the thermal power measurement and statepoint data collection procedure (ST-26) to collect the data necessary to perform any required adjustments. Setpoints, originally adjusted to initial values specified by vendors, were changed when actual values became available. Steam flow transmitter data, for both transmitters in the same loop, failed to meet the flow difference limits in two cases. A test exception was taken and Westinghouse concurred with escalation to the next plateau was satisfactory.

ST-24, Automatic Reactor Control, was completed at 30%; no further testing was required The test was satisfactory and there were no test exceptions.

Initial core performance (ST-29) and power coefficient (ST-30) data were taken, and all results met acceptance criteria. Testing of the steam generator feedwater pump automatic speed control (ST-25) yielded satisfactory results. Similarly, load swing tests (ST-34) were satisfactory, although results met acceptance criteria, some exceeded the notification requirement to Westinghouse. Level variations in two instances, and one pressure swing were slightly outside the limits.

Water chemistry (ST-42) at the 30% power level test plateau, found that cation conductivity and sulfates in the steam generators, and the specific cation conductivity in the main steam, feedwater and condensate systems, were above the limits in the Westinghouse Secondary Water Chemistry Manual. The source of these contaminates was identified as original system preservatives. With Westinghouse and Chemistry Department approval, a test exception was prepared. The mechanism for removal is continued operation.

In the initial section of testing of the Process Computer (ST-43), MPCS software of four systems was verified. Five test exceptions were necessary; two, related to the method of data collection, were resolved by procedure changes, the others, required instrument repair or adjustment.

Additional data on thermal expansion (ST-52) of snubbers and spring hangers was taken; problem sheets were developed and resolved by review. No test exceptions were necessary.

2.2 Testing at the 50% Power Level Test Plateau

The test sequence at 50% included all, or portions of twenty-one tests.

Turbine generator performance monitoring (ST-48), and a two-shift hold for water chemistry preceded testing at the 50% plateau. The chemistry problem was attributed to flushing systems previously out of service. Cleanup of secondary systems throughout PAT was accelerated by the use of auxiliary, trailer-mounted filter beds, which were frequently changed as needed.

The tests to verify/align instrumentation, conducted at 30%, were again carried out at the start of 50% testing. Steam flow (ST-28) imbalance in three steam generators was noted; again a test exception was taken, and Westinghouse concurred with escalation to the next plateau.

Loop temperatures, SG pressure, calorimetric reactor power and turbine impulse pressure were used for the first time at the 50% plateau in ST-27 to extrapolate to full power values, and make comparisons to design values. No adjustments at this level were required.

Core performance (ST-29) and power coefficient (ST-30) results were acceptable for this plateau. The value of F_{XY} was higher than the full power limit, but less than that allowed at 50%. Steam generator level control testing (ST-25) was again satisfactory. In the load swing tests (ST-34) at 50%, two test exceptions were necessary; T_{AVG} and T_{ERROR} did not return to T_{REF} within the tolerance specified. Other results required reporting to Westinghouse, as in the 30% case.

Shutdown from outside the control room, (ST-33), was performed at the 50% plateau. There were two minor problems; three computer points were not recorded by the MPCS, and a heat exchanger temperature control valve hand controller was reverse acting from what had been expected. Overall the system performed as expected and no test exceptions were generated.

A preliminary incore-excore calibration (ST-36) was performed, and from the data, extrapolated full power currents for NIS as a function of AFD, and the gain of the f(delta-I) portion of the OTdelta-T protection system were determined. With the plant at steady state conditions, the loose parts monitoring system (ST-44) operational test and quarterly surveillance was performed and no setpoint adjustments were required.

The initial radiation survey (ST-41) was taken; no discrepancies were found which would prevent escalation to the next test plateau. Water chemistry (ST-42) again found problems with contamination due to system preservatives. Westinghouse noted these were typical of plants at this stage and approved continued operation. The process and effluent radiation monitoring system (ST-45) was first tested at 50% power. Several monitors required test exceptions; these are summarized at the 100% test plateau.

2.2 Testing at the 50% Power Level Test Plateau (Continued)

Process computer verification (ST-43) at this power level generated an additional five test exceptions. One identified a software problem, one a procedure change, another an instrument adjustment and two were carryovers from the 30% testing.

The heating, ventilation and air conditioning systems were monitored (ST-46) initially at 50% power. Areas were monitored in eleven structures. Areas which were not within design limits are identified with the 100% test results.

Turbine generator (ST-48) and thermal expansion (ST-52) tests were continued at this power level.

2.3 Testing at the 75% Power Level Test Plateau

The test sequence at 75% included all, or portions of fifteen tests.

Two unplanned reactor trips occurred, the first during power escalation (30%) to the 75% plateau, and the second at the 75% power level test plateau. The first trip interrupted testing for 4 days, due to incorrect activation of generator protective relaying, and the second for 3 days, as a result of high vibration in EHC system pressure switches. Turbine setbacks were responsible for test delays of 1-2 shifts.

Fine tuning of the secondary plant, particularly the feedwater train, was the primary activity at this plateau outside the testing sequence itself. Feedwater heater level-heater drain tank level fluctuations required attention, along with bringing two heater drain pumps into service.
Gains were adjusted on feedwater regulating valve controls to eliminate feedwater flow oscillations.

Turbine generator performance monitoring (ST-48), and the repetitive tests to verify/align instrumentation were the initial test activities at the 75% plateau. Steam flow (ST-28) unbalance in two generators was noted and again, no adjustments were made. Rescaling of turbine impulse pressure and the full-power T_{AVG} program (ST-27) was necessary.

Steam generator level control (ST-25) was again satisfactory.

The results for core performance (ST-29) and power coefficient (ST-30) were as expected; $F_{\Delta H}$ continued to remain above the full power limit, but again did not prevent operation at the next plateau. Flux mapping during a controlled axial xenon oscillation (ST-36), provided incore-excore data for a multi-point analysis; from which AFD calibrations were performed.

Water chemistry (ST-42) results continued to exhibit problems with system preservative contamination; with continued operation permitted. The process computer verification (ST-43) yielded three additional test exceptions; two were carryovers and one was closed by adjusting a tolerance specification. Thermal expansion measurements (ST-52) continued.

2.3 Testing at the 75% Power Level Test Plateau (Continued)

The initial large load reduction (ST-35) was conducted at 75%. The test, a reduction from 77% to 31% (540 MWe), was completed without problems. Load swing tests (ST-34), at this plateau, met acceptance criteria, but again, certain parameters exceeded Westinghouse reporting requirements.

Heat treatment of the circulating water intake tunnel by flow reversal (ST-49) was scheduled for the 75% test plateau. A chlorination system, installed after the procedure had been planned, appears to be effectively eliminating the buildup of marine organisms in the tunnel, so the test was deferred. Operation in this mode is not assumed in the safety analysis, therefore, the decision to defer the test will not affect a successful completion of PATP, or the overall Startup Test Program.

2.4 Testing at the 90% Power Level Test Plateau

The test sequence for 90% included process temperature instrumentation (ST-14.1), thermal power measurements (ST-26), reactor control system adjustments (ST-27), and steam flow/feedwater flow (ST-28) adjustments. Steam flow (ST-28) mismatch was found in only one generator; respanning of flow transmitters was planned at 100%.

Core performance measurements (ST-29) were continued, with results similar to those at the 75% plateau. Additional turbine generator data (ST-48) was collected.

2.5 Testing at the 100% Power Level Test Plateau

The test sequence at 100% included all, or portions of twenty-seven tests.

The moisture separator reheaters (MSR) were placed in service after the 90% testing in order to improve plant efficiency. This resulted in turbine impulse pressure and full power T_{AVG} program adjustments (ST-27). The tests to verify/align instrumentation were again repeated at this plateau. The eight steam flow transmitters (ST-28) were respanned, and the steam flow mismatch corrected.

At this plateau, the core performance evaluation (ST-29) yielded a value of F_{XY} which slightly exceeded the full power limit. Analysis determined that there was sufficient margin between all possible operating conditions and the technical specification limit on F_{XY}. A test exception was taken. The power coefficient (ST-30) measurement was satisfactory. The check of AFD (ST-36) at full power verified the calibrations performed at 75%.

Steam generator moisture carryover (ST-37) was measured using isotopic lithium, rather than radioactive sodium. Results analysis, performed by Combustion Engineering, showed that steam generator moisture carryover performance was very good with a carryover percentage far less than the maximum allowable moisture carryover.

2.5 Testing at the 100% Power Level Test Plateau (Continued)

The full power load swing test (ST-34) was coordinated to also provide data for the process computer (ST-43) and loose parts monitoring (ST-44). There were two deviations in the load swing test; manual intervention was required to control level oscillations on one steam generator, and T_{AVG} which failed to return to T_{REF} within specification. GETARS showed that the generator oscillation was converging when manual control was taken, and the temperature problem occurred because control rods reached a fully withdrawn position before returning temperature to the desired value.

The large load reduction (ST-35) at full power was from 100% to 48%, (620 MWe). During the load reduction, feedwater pump suction pressure during the transient fell below the feedwater pump trip setpoint, but no trip occurred. The trip circuit, which utilizes 2 out of 3 logic, was examined after the test, and the failure determined to have resulted from two problems; the trip setpoint was adjusted to below the desired point, and an incorrect head pressure correction was used. Necessary changes in the adjustment process have been made to prevent a reoccurrence and the setpoint is being lowered. As in the load swing test, the test was coordinated to provide data for the process computer (ST-43) and loose parts monitor
(ST-44).

The unit trip from 100% power (ST-38) was coordinated with three startup tests; process computer (ST-43), loose parts monitoring (ST-44) and dynamic vibration (ST-51). Plant performance during the trip was generally as expected. Three operational responses were noted; pressurizer pressure dropped below expected, and was reported to Westinghouse, steam generator narrow range level spiked high and caused a feedwater isolation signal, and an excess demand signal was noted during a mode change in the steam dump system. The latter two responses were addressed with a design change and a procedure change respectively.

Natural circulation (ST-22) was demonstrated immediately after the unit trip from 100%. Natural circulation was verified to be established in approximately eleven minutes and was maintained for 30 minutes. There were no test exceptions.

Loss of offsite power (ST-39) was coordinated with the plant computer test (ST-43). In general, test performance was as expected. The main plant computer system (MPCS) degraded two-seconds into the test and a computer record of diesel and sequencing was lost. An observer, with a calibrated stopwatch, was able to provide the missing information. A test exception was taken. Three "vital busses" required manual shifting from DC to emergency AC after the diesels started, as expected; and a non-vital battery charger failed. Also, the control room non-vital lighting inverter did not operate and the pressurizer Group A backup heaters could not be manually energized. Each problem was addressed without need for a test exception, except for the computer failover, as noted.

2.5 Testing at the 100% Power Level Test Plateau (Continued)

The full power radiation survey (ST-41) was conducted successfully. Seven shield survey discrepancies were found, but all were dispositioned in the procedure. Water chemistry (ST-42) results again yielded results with contamination indicated, but Westinghouse and plant chemistry approved the results. The final test of process and effluent radiation monitors (ST-45) yielded six test exceptions. Two were the result of decay of short-lived isotopes before sample analysis was completed; also, an incorrect sample (valving error), a defective instrument, an activity level below a monitor sensitivity limit and a temporary modification which prevented sample flow to a monitor. Each was dispositioned promptly. Ventilation system operability (ST-46) yielded generally satisfactory results, but test data collected in certain areas of containment, the control building and the east and west pipe chases exceeded design limits. A test exception was taken, and problem areas are being evaluated by Engineering.

Three test exceptions were required for the process computer (ST-43) procedure at full power, two were related to transient tests. One exception, lack of available CPU resulting in a failover is under study, the others required no action. One channel of the loose parts monitor (ST-44), failed acceptance criteria, and a test exception was written. The channel was evaluated per instrument manual, and proper operation verified.

A total of 28 thermal expansion problems addressed during hot functional testing (ST-52) during the PAT program. All were dispositioned by engineering. Operating vibration (ST-56) measurements were satisfactory. Remeasurements of [illegible] ns were necessary when one vibration meter failed a post-measurement calibration test.

The NSSS acceptance test (ST-40) began on August 5, 1990 at 1730 hours, and ended on August 17, 1990 at 1800 hours. The test was interrupted for two hours on August 6 for stop and control valve surveillance tests at a power level of < 95%, and for approximately 1½ days on August 13 for repair of a leak in an EHC line. Power was reduced and the turbine tripped for the latter interruption. Performance was as expected, and there were no test exceptions.