CCN-89-14188

PHILADELPHIA ELECTRIC COMPANY
PEACH BOTTOM ATOMIC POWER STATION
R. D. 1, Box 208
Delta, Pennsylvania 17314
(717) 456-7014

PEACH BOTTOM—THE POWER OF EXCELLENCE

D. M. Smith
Vice President

November 17, 1989

Docket Nos. 50-277

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

SUBJECT: Peach Bottom Atomic Power Station Unit 2 Startup Report

Gentlemen:

Enclosed is the Peach Bottom Unit 2 Startup Report forwarded pursuant to Technical Specification 6.9.1.a.

Sincerely,

DMS:cmc

Enclosure

cc: R.A. Burricelli, Public Service Electric & Gas
T.M. Gerusky, Commonwealth of Pennsylvania
T.P. Johnson, USNRC Senior Resident Inspector
T.E. Magette, State of Maryland
W.T. Russell, Administrator, Region I, USNRC
H.C. Schwemm, Atlantic Electric
J. Urban, Delmarva Power
INPO Records Center

1CC132.doc

IE26
1/1

PHILADELPHIA ELECTRIC COMPANY

Peach Bottom Atomic Power Station
Unit No. 2
Docket Number 50-277

REPORT OF PLANT START-UP FOLLOWING SEVENTH REFUELING OUTAGE

March 15, 1987
TO
October 10, 1989

SUBMITTED TO
THE UNITED STATES NUCLEAR REGULATORY COMMISSION
PURSUANT TO
FACILITY OPERATING LICENSEE DPR-44

Preparation Directed By:
John T. Budzynski
Peach Bottom Atomic Power Station
R.D. #1
Delta, PA 17314

TABLE OF CONTENTS

INTRODUCTION

Unit 2 Peach Bottom Technical Specification Section 6.9.1.a Routine Reports requires submittal of a Startup Report following an outage in which fuel of a different design was installed. This report summarizes the Plant Startup and Power Ascension testing performed to assure that no conditions or system characteristic changes have been created by the Seventh Refueling Outage of Unit 2 which diminish the safe operation of the plant.

SUMMARY

Startup Testing was performed in accordance with the Final Safety Analysis Report (FSAR) Section 13.5, Startup and Power Test Program. Measured and calculated values of operating conditions and characteristics obtained during the Startup Test Program were compared to design predictions and specifications. Level 1 criterion were either met, or discrepancies were investigated and determined to have no effect on safety, reliability, operability and pressure integrity of the systems tested. Corrective actions were not required to obtain satisfactory plant operation.

Peach Bottom Unit 2 was out of service from March 15, 1987 to April 26, 1989 to accommodate the Seventh Refueling Outage, maintenance and the NRC Shutdown Order.

During this 774 day outage:

* 231 P8 x 8R - P8DRB284, 40 P8 x 8R - P8DRB285, and 1 BP8 x 8R - P8DRB299 fuel bundles were replaced with 64 GE8 x 8EB - P8DQ319, 204 GE8 x 8EB - P8DQB319, and 4 GE9B - P8DWB10 fuel bundles.

* 217 Unit 2 & Common Modifications were completed.

The Unit returned to service on May 22, 1989 and reached full power on August 4, 1989. Startup testing was completed on September 12, 1989.

The successfully implemented Startup Test Program insures that the Seventh Refueling Outage of Unit 2 has resulted in no conditions or system characteristics that diminish the safe operation of the plant.

The tests and data references in this report are on file at the Peach Bottom Atomic Power Station.

STARTUP REPORT
Peach Bottom Atomic Power Station
Unit No. 2

1. Chemical and Radiochemical

Chemical and Radiochemical analyses were performed in accordance with FSAR Section 13.5.2.2.(1):

a. Prior to Fuel Load:

Chemistry Limits per CH-10 (Chemistry Goals) were verified on a daily basis.

b. Prior to Startup:

The Shift Chemist verified that RT 7.8 (Chemistry Preparation for Reactor Startup) was performed April 26, 1989. Also verified that Chemistry Limits per CH-10 were in Specification.

c. During Startup:

Coolant chemistry was determined to meet water quality specifications and process requirements via ST 7.2.3B (Reactor Startup Chemistry [<100 Klbs/hr]) on May 3, 1989. For high steaming rates (>100 Klbs/Hr) ST 7.2.3A (Reactor Startup Chemistry) was performed on May 16, 1989.

2. Radiation Measurements

Radiation Measurements were made in accordance with FSAR Section 13.5.2.2.(2):

a. Prior to Fuel Load:

Routine surveys were taken daily throughout the protected area to assure personnel safety and to maintain Activity Buildup base data via HP 200 (Routine Survey Program).

b. During Startup:

Radiation was monitored to assure the protection of personnel and continuous compliance with the guidelines of 10CFR20 during plant operation at 35% Power, performed on June 19, 1989 and at 100% Power, performed on August 7, 1989, via ST 7.9.1 (Radiation Survey After Refueling).

3. Fuel Loading

Fuel loading, Control Rod Functional and Subcriticality Checks were performed in accordance with FSAR Section 13.5.2.2(3). Fuel loading was completed on July 1, 1987 via FH-6C (Fuel Movement and Core Alteration Procedure During a Fuel Handling Outage). Bundle locations, and orientation were verified via ST 12.10 (Core Post-Alteration Verification) and completed on July 2, 1987. Each control rod was withdrawn and inserted to verify rod coupling integrity, proper rod withdrawal and insertion, and subcriticality. Level 1 criteria was met when core shutdown margin was demonstrated with a fully loaded core on April 27, 1989. Control Rod Test data is documented in ST 10.8 (Control Rod Performance Test) completed December 1, 1988.

4. Shutdown Margin

Core shutdown margin was demonstrated in accordance with FSAR Section 13.5.2.2.(4). An "In-Sequence" shutdown margin of 2.37% delta K/K was obtained during the initial reactor startup in the A sequence. This satisfies the Level 1 criteria that the core must be subcritical by at least 0.38% delta K/K with any rod fully withdrawn. Test data is documented in ST 3.8.2 (Shutdown Margin) completed April 27, 1989.

The design predicted core Keff was compared to the measured value at initial startup on April 27, 1989. The predicted Keff was 1.00212 as compared to the measured Keff of 1.0033. The difference between predicted and measured values was -0.118%, which meets the acceptance criteria of $\pm$ 1%. The test data is documented in ST 3.9 (Critical Eigenvalue Comparison) completed April 27, 1989.

5. Control Rod Drive Testing

Control Rod Drive (CRD) testing was performed in accordance with FSAR Section 13.5.2.2.(5). In cold shutdown, each CRD was tested for position indication, normal insert/withdrawal times and coupling (ST 10.8 Control Rod Withdraw Tests). At rated reactor pressure, Position Indication (GP-2 Normal Plant Startup), Coupling (ST 10.8-1 CRD Coupling Integrity Test), and Scram Insertion Times (ST 10.13 CRD Scram Insertion Timing of Selected Control Rods) were tested. The testing performed at cold shutdown conditions satisfied Level 1 and 2 criteria.

6. Control Rod Sequence

The control rod sequence was followed in accordance with FSAR Section 13.5.2.2(6). The sequence was defined in GP-2-2 Appendix 1 (Startup Rod Withdraw Sequence Instructions) and verified for use by the Rod Worth Minimizer (RWM) via ST 10.5-1 (RWM Sequence Loading Verification) on April 19, 1989. ST 10.5 (RWM Operability Check) was performed and ST 3.8.2 (Shutdown Margin) recorded the critical rod pattern on April 27, 1989.

7. Rod Pattern Exchange

Rod pattern adjustments were performed in accordance with FSAR Section 13.5.2.2(7). Rod pattern adjustments were guided by RE-31 (Reactor Engineering Startup/Load Drop Instructions) throughout the power ascension program. Thermal limits were not exceeded.

8. SRM Performance

Source Range Monitor (SRM) instrumentation operability was checked during performance of startup procedure GP-2. FSAR Section 13.5.2.2.(8) criteria of a minimum count rate of 3 counts/sec. was verified to be met for the SRM's. Data is documented in GP-2 dated April 27, 1989.

9. IRM Performance

Intermediate Range Monitor (IRM) performance was tested in accordance with FSAR Section 13.5.2.2.(9). The IRM scram set-points met the Level 1 criteria of SI2N-60C-IRM-A4CW (Intermediate Range Monitor Channel "A" Calibration/Functional Check) and SI2N-60C-IRM-B4CW (Intermediate Range Monitor Channel "B" Calibration/Functional Check) dated April 25 and 26, 1989.

10. LPRM Calibration

Local Power Range Monitor (LPRM) calibrations were completed in accordance with FSAR Section 13.5.2.2.(10). Calibrations were performed at 33% and 70% rated thermal power per ST 3.4.1 (LPRM Gain Calibration) on 5-31-89 and 7-19-89 respectively.

11. APRM Calibration

Numerous Average Power Range Monitor (APRM) calibrations were completed during startup in accordance with FSAR Section 13.5.2.2.(11). Test data is documented in ST 3.3.2's completed from May 30, 1989 at 35% power to July 5, 1989 at 69% power.

12. Process Computer

The Process Computer was tested in accordance with FSAR Section 13.5.2.2(12). A manual calculation was performed via ST 3.11 (Checkout of the NSS Computer Calculation of Core Thermal Power) at approximately 70% power on July 13, 1989 and 100% power on August 9, 1989.

The thermal limit calculations were verified by General Electric via BUCLE with full-power data provided by the Process Computer.

13. RCIC System

Reactor Core Isolation Cooling (RCIC) system was tested in accordance with FSAR Section 13.5.2.2.(13). A controlled start was performed at 150 psig via ST 10.2 (RCIC Flow Rate at 150 psig) on May 4, 1989. A Cold Quick Start at Rated Pressure was performed via ST 6.11 (RCIC Pump, valve, Flow & Cooler) on May 17, 1989. RCIC Controller Stability was checked by ST 26.5-2 (RCIC Flow Controller Stability) at 150 psig on May 4, 1989 and at Rated Pressure on May 17, 1989. No adjustments were required.

14. High Pressure Cooling Injection (HPCI) System

A controlled start was performed at 150 psig via ST 10.1 (HPCI Flow Rate at 150psig) on May 5, 1989. A Cold Quick Start at Rated Pressure was performed via ST 6.5 (HPCI Pump, Valve, Flow & Cooler) on May 17, 1989. HPCI Controller Stability was checked by ST 26.4-2 (HPCI Stability) at 150 psig on May 5, 1989 and at Rated Pressure on May 17, 1989. No adjustments were necessary.

15. Core Power Distribution

Core power symmetry and Transversing Incore Probe (TIP) reproducibility were tested in accordance with FSAR Section 13.5.2.2.(17). Two full sets of TIP traces were obtained at approximately rated power on August 12, 1989. The TIP readings were within the standard deviation used to establish safety limit criteria of 8.7%, per General Electric Document NEDE-24011 Table S.2-1. The maximum deviation between symmetrically located pairs satisfied the 25% acceptance criteria for core power symmetry. Test data is documented in the RE-27 (Peach Bottom 2 and 3 Core Power Symmetry and TIP Reproducibility Test) procedure completed August 12, 1989.

16. Core Performance

Core performance was evaluated in accordance with FSAR Section 13.5.2.2(18). The core thermal limits were verified daily above 25% power via the Process Computer. ST 3.7-2 (Reactor Anomalies) verified the Full Power Control Rod Pattern provided by the PECo Fuel Management Section and General Electric and was completed on August 6, 1989.

17. Pressure Regulator

Pressure Regulator Control response was verified in accordance with FSAR Section 13.5.2.2.(21). At 33% and 69% Reactor Core Thermal Power, positive and negative step changes of 3 psi and 5 psi were introduced into each pressure regulator control circuit. Decay ratios were less than 0.25 and met both FSAR Level 1 and Level 2 criteria. Test data is documented in ST 26.7-2 (Pressure Regulator Stability Test) dated May 26, 1989 (33% power) and July 3, 1989 (69% power).

18. Feedwater System

Feedwater controller stability testing was performed in accordance with FSAR Section 13.5.2.2.(22) to demonstrate acceptable reactor water level control. The response of each reactor feedpump to changes to the master level controller of plus and minus three and six inches of level change was observed at 35%, 45%, 70%, and 100% rated power. The overall feedwater control system tested in the three element mode displayed satisfactory system response. Full power test data is documented in ST 26.1-2 completed August 11, 1989.

The "B" Reactor Feed Pump (RFP) was tripped at approximately 70% Core Thermal Power. The three RFPs were in-service at approximately 2.9 Mlb/Hr. The "A" and "C" RFPs picked up the flow and stabilized Reactor Water level within 2 minutes. Test data is documented on SP-1232 (Feed Pump Trip) dated July 5, 1989.

The "B" Reactor Recirculation Pump was tripped at approximately 70% Core Thermal Power. The feedwater control system satisfactorily controlled the water level, avoiding a turbine trip on high water level. Test data is documented in SP-1231 (Recirculation Pump Trip) dated July 6, 1989.

19. Relief Valves

Relief Valves were tested in accordance with FSAR Section 13.5.2.2.(25). Each Safety Relief Valve (SRV) was manually cycled at 178 psig Reactor Pressure Vessel (RPV) Pressure. Test Data is documented in ST 10.4 (Relief Valve Manual Actuation) dated May 9 & 14, 1989.

20. Flow Control

Plant response to changes in recirculation flow was tested according to FSAR Section 13.5.2.2.(28). At 69% Reactor Core Thermal Power, positive and negative step changes of approximately 8% pump flow were introduced into the Recirculation Manual/Auto Transfer Station. Each recirculation pump was tested individually. The decay ratios were less than 0.25 for oscillatory variables, and met both FSAR Level 1 and Level 2 criteria. Test data is documented in ST 26.6-2 (Recirculation Controller Stability Testing) dated July 3, 1989.

21. Recirculation System

The Recirculation System was tested in accordance with FSAR Section 13.5.2.2.(29). The "B" Recirculation Pump was tripped at 69% Reactor Core Thermal Power with 100% Core Flow. This configuration was utilized in order to maximize the effect of the recirculation pump trip. Both pumps were running at a nominal 81% speed. Test data is documented in SP 1231 (Recirculation Pump Trip) dated July 6, 1989.

A Recirculation Pump Runback was also performed at 69% Reactor Thermal Power with 100% Core Flow. The runback functioned properly with both core thermal power and RPV level stabilizing within 27 seconds. Test data is documented in SP 1230 (Recirculation Pump Runback) dated July 5, 1989.

Jet Pump Operability was checked during the performance of Startup Procedure GP-2, and documented in ST 9.21-2 (Jet Pump Operability) dated April 27, 1989. Jet pump calibration was verified at 100% Reactor Core Thermal Power in ST 13.30-1 (Core Flow Calibrated Verification U/2) dated August 25, 1989.