PENNSYLVANIA POWER AND LIGHT COMPANY.

SUSQUEHANNA STEAM ELECTRIC STATION

UNIT NO. 1

SUPPLEMENTARY STARTUP REPORT

BY

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SUPERINTENDENT OF PLANT

FOREWARD

This Supplementary Startup Report addresses the events and retesting performed following the Pre-Commercial Operations Outage and commencement of commercial power operations. This report supplements applicable sections of the Startup Report approved June 9, 1983. For consistency, section and subsection numbers in this report are the same as in the Startup Report.

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SECTION I

INTRODUCTION

1.1 REPORT ABSTRACT

This Supplementary Startup Report, written to comply with Regulatory Guide 1.16 Revision 4, Section c.1.a, and Technical Specifications paragraph 6.9.1.1 thru 6.9.1.3, addresses the events and retesting performed following the Pre-Commercial Operations Outage and addends the Startup Report for the Susquehanna Steam Electric Station Unit 1.

This report contains a description of the measured values of the operating conditions or characteristics obtained during testing performed following the Pre-Commercial Operations Outage, including turbine valve and pressure regulator testing subsequent to the modification from partial arc to full arc turbine control valve steam admission and ending with Commercial Operation of Unit 1 on June 8, 1983.

SECTION 2

SUMMARY

2.1 OVERALL EVALUATION

Items from Section 2.1 of the Startup Report for which modification or corrective maintenance, retesting and testing results appear in this report are:

1. Verification of Residual Heat Removal heat exchanger capacity in the Steam Condensing Mode of operation. (ST 8.5)

4. Retest of inboard Main Steam Isolation Valve F022C at 5% and maximum testable power following the repair of an oil leak in the valve actuator. (ST 25.2)

5. Retest of the pressure regulator following main turbine control valve conversion from partial arc to full arc admission. (ST 22.1, ST 22.2)

6. Reperformance of turbine control and stop valve surveillance testing following main turbine control valve conversion from partial arc to full arc admission. (ST 24.1, ST 24.2)

Items from Section 2.1 of the Startup Report which remain as Open Startup Test Program Items are:

2. Continue investigation of failure to meet Reactor Recirculation Pump coastdown criteria during an RPT event. The plant will continue to operate with the technical specification operational MCPR limit for End of Cycle RPT inoperable input into the process computer until this item is resolved.

3. Retest ability to maintain acceptable offgas system guard bed inlet dewpoint temperatures after design modifications are made. This will be done prior to Cycle 2 Startup.

The above open items are considered as Unresolved Items in the NRC Inspection Report 50-387/83-08.

2.2 SUMMARY OF KEY EVENTS

June 1, 1983 Post Pre-Commercial Operations Outage Startup Retesting completed.

June 8, 1983 Susquehanna Unit 1 Declared Commercial

2.3 STARTUP TEST PROGRAM CHRONOLOGY

May 30, 1983 Completed Main Steam Isolation Valve F022C Retesting at 88.5% Power

June 1, 1983 Achieved 100% power.

Pressure Regulator retesting completed.

Control and Stop Valve retesting completed.

RHR Steam Condensing Mode retesting completed.

June 2, 1983 Testing of Common Offgas Recombiner completed.

June 8, 1983 Susquehanna Unit 1 Declared Commercial

SECTION 4

STARTUP TEST RESULTS

4.8 (ST 8) RESIDUAL HEAT REMOVAL SYSTEM

ST 8.4 STEAM CONDENSING MODE STABILITY TEST

The results of the testing demonstrated acceptable stable response to step changes in heat exchanger pressure and level when the Residual Heat Removal System was operated in the Steam Condensing Mode.

The Acceptance Criteria were as follows:

Level 1

The transient response to any system related variable to any test input must not diverge.

Level 2

The decay ratio for system related variables containing oscillatory modes of response must be less than or equal to 0.25.

This test was performed at 96% rated reactor thermal power, individually for each RHR heat exchanger. Maximum allowable step changes were made to heat exchanger level and pressure and the response was recorded by the transient recording system (GETARS). The transient plots were then analyzed to verify that all control system related variables behaved in a manner consistent with design parameters.

All Acceptance Criteria and test objectives as set forth in the Final Safety Analysis Report were satisfied.

(ST 8.5) STEAM CONDENSING MODE

The results of the testing showed that the Residual Heat Removal System was capable of operating in the Steam Condensing mode of operation at a heat exchanger capacity of 155 x 10^6 BTU/HR (single heat exchanger operation) and at a capacity of 107 x 10^6 BTU/HR (dual heat exchanger operation) (values obtained from the GE process diagram).

The Acceptance Criterion was as follows:

Level 1

NONE

Level 2

The RHR System shall be capable of operating in the STEAM CONDENSING MODE at the heat exchanger capacity specified in process diagrams. Both simultaneous operation of RHR loops and single loop operation shall be tested in this mode.

With the reactor at rated pressure, the RHR Heat Exchangers accepted steam from the reactor via the High Pressure Coolant Injection steam supply line and discharged condensate initially to the suppression pool. Upon acceptable water quality from the heat exchanger discharge, the Reactor Core Isolation Cooling System was lined up to take suction from the heat exchanger, discharging condensate into the reactor. Data was collected in both single and dual heat exchanger operation and analysis performed to show that the heat exchanger capacities as specified in the process diagram could be met, thus satisfying the test objective and Acceptance Criterion.

4.22-A (ST22) PRESSURE REGULATOR (Testing Following Conversion From Partial To Full Arc Steam Admission)

The results of the testing showed that the Pressure Regulator controller settings provided smooth and stable response to pressure changes and simulated Pressure Regulator failures. This retesting was performed for the purpose of demonstrating response and stability following the conversion of control valve steam admission from partial arc to full arc.

The Acceptance Criteria were as follows:

Level 1

1. The transient response of any pressure control system related variable to any test input must not diverge.

Level 2

1. Pressure control system related variables may contain oscillatory modes of response. In these cases, the decay ration for each controlled mode of response must be less than or equal to 0.25 when operated above the lower limit of the automatic load following range.

2. When in the recirculation manual mode, the pressure response time from initiation of pressure setpoint step change to the turbine inlet pressure peak shall be less than or equal to 10 seconds.

3. Pressure control system dead band, decay, etc., shall be small enough that steady state limit cycles (if any) shall produce steam flow variations no larger than ±0.5 percent of rated steam flow.

4. The normal difference between regulator set points must be small enough that the neutron flux remains below its scram value by a margin of 7.5 percent.

5. The normal difference between regulator set points must be small enough that peak vessel pressure remains below the scram setting by a margin of 10 psi.

ST 22.1, Pressure Regulator Test - Control Valves Controlling, and ST 22.2, Pressure Regulator Test - Control Valves and Bypass Valves Controlling, were conducted at 20%, 75% and 100% rated reactor thermal power following the startup subsequent to the Pre-Commercial Operation Outage. The response of the regulator to step changes and simulated regulator failures was stable and no steady state limit cycles were observed. The response times and margins-to-scram were as follows:

TEST	% POWER	MAX RESPONSE TIME	MARGIN - TO - SCRAM NEUTRON FLUX	HIGH PRESSURE
22.1	20	4.0 Sec	95.2%	102 psi
22.2	20	5.0 Sec	96.2%	102.1 psi
22.1	75	4.8 Sec	35.8%	66 psi
22.2	75	6.5 Sec	37.2%	66.7 psi
22.1	100	5.4 Sec	11.8%	40.2 psi
22.2	100	4.0 Sec	11.2%	40.5 psi
Acceptance Criterion		$\leq$10.0 Sec	$\geq$7.5%	$\geq$10.0 psi

All Acceptance Criteria and test objectives as set forth in the Final Safety Analysis Report were satisfied.

4.24A (ST 24) TURBINE VALVE SURVEILLANCE (Testing Following Conversion From Partial To Full Arc Steam Admission)

The results of the testing showed that acceptable margins to - scram existed, following the conversion of control valve steam admission from partial arc to full arc, to enable periodic surveillance testing of the control and stop valves up to the 100% rated reactor thermal power level.

The Acceptance Criteria were as follows:

Level 1

NONE

Level 2

1. Peak neutron flux must remain at least 7.5% below the neutron flux scram trip value (118%).

2. Peak vessel pressure must remain at least 10 psi below the high pressure scram setting (1037 psig).

3. Heat Flux must remain at least 5% less than its flow biased scram value (113.5%).

4. Peak steam flow in each line must remain at least 10% below the high flow isolation trip setting (134%).

The testing consisted of the opening and closing of the valves individually, recording the parameter changes and calculating the margin to scram for reactor pressure, heat flux, neutron flux and peak steam line flow isolation. The margins - to - scram were as follows:

			MARGINS - TO - SCRAM		
TEST	% POWER	PRESSURE	NEUTRON FLUX	HEAT FLUX	HIGH STEAM LINE FLOW
24.1	100	44 psi	14.5%	12.6%	27.2%
24.2	100	37 psi	13.4%	11.4%	26%
Acceptance Criterion		≥10 psi	≥7.5%	≥5.0%	≥10.0%

All Acceptance Criteria and test objectives as set forth in the Final Safety Analysis Report were satisfied.

4.25 (ST 25) MAIN STEAM ISOLATION VALVES (Retest Of Inboard Main Steam Isolation Valve (MSIV) F022C Following Repair Of An Oil Leak In The Valve Actuator)

The results of the testing showed that surveillance testing of the fastest MSIV could be conducted at 88.5% rated reactor thermal power and still yield acceptable margins - to - scram for pressure, neutron flux, heat flux and high steam line flow isolation. The testing also showed that closure times for the fastest MSIV were consistent with the Plant Technical Specifications and the Final Safety Analysis Report.

The Acceptance Criteria were as follows:

Level 1

1. Closure time for any MSIV, including delay, shall not be greater than 5.0 seconds.

2. Closure time for the fastest MSIV shall be greater than or equal to 2.5 seconds.

3. The time delay between the close initiation signal and the extrapolated initial valve movement from 100% open for any MSIV shall be less than or equal to 0.5 seconds.

4. The closure time for any MSIV shall not be less than 3.0 seconds. (Based on Technical Specification Limiting Condition for Operation 3.4.7)

Level 2

1. During full closure of individual MSIVs, peak vessel dome pressure must remain at least 10 psi below the flow biased scram setting value.

2. During full closure of individual MSIVs, peak neutron flux must remain at least 7.5% below its scram value.

3. During full closure of individual MSIVs, steam flow in individual lines must remain at least 10% below the high flow isolation trip setting.

4. During full closure of individual MSIVs, the peak simulated heat flux must remain at least 5% less than its scram value.

Full closure of MSIV F022C was performed at 5%, 85% and 88.5% rated reactor thermal power following repair of an oil leak in its valve actuator during the Pre-Commercial Operations Outage. Margins to scram or isolation from neutron flux, reactor pressure, heat flux and steam flow were calculated during the 5% and 85% power implementations to extrapolate the highest power level at which the valve could be tested.

This power level was determined to be 88.5% rated reactor thermal power, at which the final implementation took place.

The results of each implementation were as follows:

POWER LEVEL	CLOSURE TIME MIN	CLOSURE TIME MAX	MARGIN - TO - SCRAM NEUTRON FLUX	PRESSURE	HEAT FLUX	HIGH STEAM LINE FLOW
5%	3.46 Sec	3.84 Sec	112%	116 psi	54.8%	122%
85%	3.32 Sec	3.70 Sec	19%	34 psi	11.3%	23%
88.5%	3.39 Sec	3.76 Sec	18.4%	37 psi	5.7%	19%
Acceptance Criterion	$\geq$3.0 Sec	$\leq$5.0 Sec	$\geq$7.5%	$\geq$10.0 psi	$\geq$5.0%	$\geq$10.0%

All Acceptance Criteria and test objectives as set forth in the Final Safety Analysis Report were satisfied and verified to be consistent with the Plant Technical Specifications.

4.37 (ST 37) GASEOUS RADWASTE SYSTEM (IMPLEMENTATION Of ST 37.1 Utilizing The Common Recombiner)

The objective of this test was to demonstrate that the Gaseous Radwaste System operates within the Technical Specification and design limits. Subtest 37.1, Gaseous Radwaste Data Collection, was repeated, subsequent to the Pre-Commercial Operations Outage, utilizing the Common Recombiner, since the Unit 1 Recombiner had been solely in service during the Startup Test Program.

The Acceptance Criteria were as follows:

Level 1

1. The release of radioactive gaseous and particulate effluents must not exceed the limits specified in the site Technical Specifications..

2. There shall be no less than 8,000 lbs/hr of dilution steam flow when the steam jet air ejectors are pumping.

Level 2

1. The system flow, pressure, temperature and dew point shall comply with design specifications.

2. The catalytic recombiner, the hydrogen analyzer, the activated carbon beds and the filters shall be performing their required functions.

This test for the Common Recombiner in service was performed at 99.7% rated reactor thermal power. Offgas system operational parameters were monitored and recorded to verify proper system operation. Gaseous grab samples were collected for radioactivity analysis. Both Level 1 Acceptance Criteria were satisfied along with Level 2 Acceptance Criterion No. 2. Problems were encountered similar to those during the performance of ST 37.1 on the Unit 1 Recombiner. They were:

Various instrumentation problems were encountered which will require modification, repair and/or recalibration of the instruments.

The mist eliminators are not performing their intended function. Moisture is being carried over from the chiller to the mist eliminator and to the charcoal beds. A plant modification to replace the mist eliminators will be made as soon as practicable. Continued operation until the modification can be implemented is being justified by the low effluent radiation levels encountered thus far with the system in operation.

The ability to maintain acceptable offgas system guard bed inlet dewpoint temperatures will be demonstrated after design modifications are made and prior to Cycle 2 Startup.