

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 50-388/84-30

Docket No. 50-388

License No. NPF-22 Priority --- Category C

Licensee: Pennsylvania Power and Light Company

2 North Ninth Street

Allentown, Pennsylvania 18101

Facility Name: Susquehanna Steam Electric Station, Unit-2

Inspection At: Salem Township, Pennsylvania

Inspection Conducted: July 4-6, 1984

Inspectors: D.J. Florek  
D.J. Florek, Reactor Engineer

7/23/84  
date

Approved by: H.H. Nicholas for  
L.H. Bettenhausen, Chief Test  
Programs Section

8/6/84  
date

Inspection Summary: Inspection on July 4-6, 1984 (Report No. 50-388/84-30)

Areas Inspected: Routine unannounced inspection of Unit-2 start up test program including witnessing the conduct of the test shutdown from outside the control room, start-up and start-up test results evaluation. The inspection involved 18 hours onsite by one region based inspector.

Results: Within the scope of this inspection, no items of noncompliance were identified.

## DETAILS

### 1. Persons Contacted

#### Pennsylvania Power and Light Co.

J. Blakeslee, Senior Results Engineer  
H. Keiser, Superintendent of Plant  
J. Klucar, Lead Shift Test Engineer  
T. Nork, Startup Coordinator  
M. Sager, NPE  
C. Smith, Reactor Engineer  
\*D. Thompson, Assistant Superintendent of Plant  
R. Whery, Start-up Test Engineer

#### General Electric Corporation

T. Czubakowski, Lead Start-up Test Engineer

#### Bechtel Power Corporation

D. Tharaka, Engineering

#### U.S. Nuclear Regulatory Commission

R. Jacobs, Senior Resident Inspector  
L. Plisco, Resident Inspector

The inspector also contacted other licensee employees, members of the technical and engineering staffs and operations staff including shift supervisor, unit supervisors and reactor operators.

\*Denotes those present at exit meeting on July 6, 1984.

### 2. Start-up Test Program

#### References

- Susquehanna Steam Electric Station (SSES) Final Safety Analysis Report (FSAR).
- SSES Safety Evaluation Report and Supplements 1,2,3,4 and 5.
- Regulatory Guide 1.68 "Initial Test Programs for Water Cooled Reactor Power Plants".
- SSES Start-up Test Schedule

- AD-TY-460 "Start-up Test Administrative Procedure".

## 2.1 Start-up Test Witnessing

### Scope

The inspector witnessed the conduct of portions of the shutdown from outside the control room start-up test. The inspector assessed whether current procedures were being utilized, minimum crew requirements met, test prerequisites satisfied, technical specifications and license conditions satisfied, transient monitoring data recorded, crew actions adequate and timely with good coordination observed, quick summary analysis of data performed, all data collected, test acceptance criteria satisfied.

The following procedures were reviewed and utilized during the conduct of the test:

- ST-28.1 "Shutdown and Cooldown Demonstration" Revision 2 dated February 24, 1984
- EO-200-009 "Plant Shutdown From Outside Control Room" Revision 1 dated June 5, 1984

### Test Performance

The test was performed at 0100 hours on July 5, 1984. This test was witnessed by three NRC inspectors (two residents and one region based inspector). The monthly resident inspector report will also contain information regarding this test. The inspector observed that the plant was at 19% power at the time of the test. The inspector verified that the shutdown panel switches were in their correct position prior to conduct of the test, a current copy of EO-200-009 was available in the remote shutdown room, the suppression pool level was at 22.5 feet and that the condensate storage tank was 80% full to satisfy initial test conditions. The inspector witnessed the conduct of the shift briefings and verified that EO-200-009 was reviewed by the on-shift personnel prior to the conduct of the test. The start-up test director also briefed the on shift operations personnel on the data needs of ST-28.1.

The control room personnel were monitoring the actions performed at the remote shutdown panel on available instrumentation and the computer. Action in the control room was limited to providing non-safety related equipment protection from damage during this test. This was true for all cases except recirculation pump A suction valve which is discussed later.

The inspector assessed plant response from the control room. As

control was taken at the remote shutdown panel, indication and control was lost from the main control room. Communication was maintained between the main control room and remote shutdown panel. Cooldown proceeded smoothly. Reactor Core Isolation Cooling (RCIC) was utilized to control level and pressure. The inspector observed use of Safety Relief Valves (SRV) to reduce pressure during the cooldown, SRV A from 600-400 psig, SRV B from 385-318 psig, and SRV C from 271-116 psig. The inspector observed that, prior to operation with the shutdown cooling mode of RHR, the bottom head temperature was 319°F and, when the test was terminated, bottom head temperature was 240°F. The test was terminated around 0820 on July 5, 1984.b

During the course of the test the inspector observed that communication had been established at the instrument racks on elevation 749 of the reactor building. He also observed that the transient monitoring system (GETARS) was operating. The inspector then witnessed portions of the testing conducted at the remote shutdown panel. The resident inspectors continuously witnessed activities at the remote shutdown panel.

Shortly after the remote shutdown panel was activated, the operators in the control room observed that the recirculation pump suction valve B was being controlled from the remote shutdown panel and the A loop valve controlled from the local breaker. By design and by procedure E0-200-009 recirculation pump suction valve A should have been controlled from the remote shutdown panel and the B loop should have been controlled from the local breaker. This was discovered several hours before operation of the suction valve to the recirculation pump was required to be operated for shutdown cooling. The licensee decided to operate the A valve from the control room to conduct this start-up test. Subsequent to the conduct of this test, the licensee operated the A suction valve by performing the breaker and jumpering actions necessary for local control. Test Exception Report (TER)-51 was written to document the error identified.

The inspector concluded that the test was conducted in accordance with the administrative program and technical specification.

## 2.2 Test Results Evaluation

The 12 completed start-up tests in Appendix A were reviewed. The completed start-up tests were reviewed to assess that:

- Each was approved in accordance with administrative procedures;
- Test changes were annotated and completed if appropriate;
- Basic test objectives were met;

- Changes and test exceptions were noted;
- Test exceptions were resolved and accepted by management;
- Retests were completed if required;
- System or process changes necessitated by a test deficiency were properly documented and reviewed;
- Proper reporting of deficiencies;
- Data sheets were completed;
- Data was within tolerances;
- Test steps and data sheets were properly signed and dated;
- Engineering evaluation of test data;
- Test results were compared with established acceptance criteria;
- Documented review and acceptance of tests results;
- Offsite review committee and follow-up if audited;
- QA or independent review of tests results; and
- Test results have been approved by appropriate management.

#### Findings

All start-up tests were completed. All data was taken except as noted in test exceptions. Each start-up test had been independently assessed. Quality Assurance (QA) review and comment was in the process of being completed at the time of this inspection. The management review and approval had not been completed. The inspector witnessed portions of Test Review Committee (TRC) meeting 84-021, a necessary step in the review and approval of test results. The TRC reviewed Start-up Tests (ST) - 1.7, 2.1, 5.7, 10.2, 11.2, 12.2, 19.1, 22.3, 23.1, 28.1, 28.2, 37.1, and 99.2, Start-up Test Change Notices (STCN) - 78, 79, 80, 81, 82, 83, and test exceptions TER - 50, 51, 52, 53, 54, 55, and 42. A subsequent inspection will review the completion of the licensee review and approval of the test results and test exceptions.

A summary of the individual ST results follows.

ST-1.7 Chemistry Data-Power Ascension Tests

One test exception was identified (TER-55). The pH of the feedwater was 6.4, with the acceptance criteria range of 6.5 - 7.5, and the oxygen concentration of the CRD cooling water was 60 ppb, with the acceptance criteria of less than 50 ppb. All other acceptance criteria were satisfied. The resolution was to take another water sample as a prerequisite to leaving test condition TC-1 after verifying valve line up is correct. Following successful chemistry results, the plant can proceed to TC-2 test conditions.

ST-2.1 Start-up Test Program Radiation Survey

The test met all acceptance criteria. The test exception on the CRD suction filter area did not exist subsequent to changeout of the filter.

ST-5.7 Scram Timing - Selected Rods During Planned Times.

Data was lost for the first 11 minutes following the planned scram for the shutdown from outside the control room. All rods scrambled during the test, however, scram timing data was lost. Test Exception (TER-52) was written. See additional discussion as part of ST-28.1.

ST-10.2 IRM/APRM Overlap Verification

All acceptance criteria were satisfied

All IRM's were less than 37/125 on Range 10 with APRM readings equal or greater than 5%.

<u>IRM</u>	<u>x/125</u>	<u>APRM</u>	
A	23	A	11
B	9	B	10
C	30	C	11
D	16	D	10
E	20	E	10
F	26	F	11
G	16		
H	21		

## ST-11.2 LPRM Calibration Without Process Computer

85 LPRM Gain adjustment factors (GAF) did not fall within the acceptance criteria. TER 53 was written. One set of TIP readings was taken and input into the computer code BUCLE to obtain LPRM GAF's. The confirmatory TIP traces could not be completed because of TIP Machine A failure. Three LPRM's failed downscale and were bypassed.

The remaining LPRM GAF's were just outside the acceptance criteria. The resolution is to reperform LPRM calibration at power levels of TC-2 as the LPRM's signals become more steady and reliable. The APRM GAF were set equal to 1 based on a heat balance.

## ST-12.2 High Power APRM Calibration

Acceptance criteria were satisfied. The inspector questioned the licensee STCN-081 which deleted step 12.2.3.2 as an initial condition for ST-12.2. This step verified that the scram setpoint is set equal to or less than 90% of rated power. The inspector indicated that Regulatory Guide 1.68 states in Appendix C, Section 4.d, that just prior to ascending to the next level, the high flux trips should be set to a value no greater than 20% beyond the power of the next level unless technical specifications are more restrictive. Subsequent to this discussion the licensee reduced the high power flux setpoint to 65% (20% above the value for TC-2).

## ST-19.1 BUCLE Calculation

All acceptance criteria were satisfied.

Actual	CTP	=	18.6%	
	MFLPD	=	.255	
	MFLCPR	=	.331	
	MAPRAT	=	.247	
	CPRLIM	=	1.556	
	MCPR	=	1.24	
	K(f)	=	1.25	Using automatic recirculation flow control curve

The inspector verified selected input data into BUCLE and identified no discrepancies.

## ST-22.3 Pressure Regulator Test - Bypass Valves Controlling

One test exception (TER-54) was identified because the test at this condition is conducted at steam flows which are too low to be analyzed. The Steady State pressure was 921 psig with the peak at 922 psig.

## ST-23.1 Feedwater System Start-up Controller and Level Step

Test met acceptance criteria. There was no divergence of signals.

## ST-28.1 Shutdown and Cooldown Demonstration

(See Section 2.1, Test Witnessing) Test was begun at 0100. The control room was evacuated at 0101 and the remote shutdown panel assumed control at 0104. Reactor cooldown was controlled from the shutdown panel. Shutdown cooling was instituted at reactor pressure of 85 psig (315°F). The testing was completed with reactor pressure of 40 psig (265°F). Testing was terminated at 0820 hours.

Two test exceptions were identified. TER-51 concerned the inability to control recirculation pump A suction valve from the remote shutdown panel as stated in design and procedure. The resolution is to modify the procedure in the short term to reflect the as is design and to perform the operation of this valve locally. The longer term solution is to add the capability at the remote shutdown panel. This is considered to be an unresolved item (388/84-30-01).

TER-50 concerns the loss of the first 11 minutes of data on the GETARS. The data was lost when data acquisition was changed from the SENTINEL mode to the RTEM-RECORD Mode. This also lost data in support of ST-5.7. Corrective steps will be taken to preclude reoccurrence. For this test, control room strip charts were utilized in lieu of GETARS data.

## ST-28.2 Reactor Scram from Outside the Control Room

Reactor scram and MSIV closure from outside the control room were accomplished.

## ST-37.1 Gaseous Radwaste Data Collection

All acceptance criteria were satisfied.

All Test Exceptions are recorded and monitored as part of the licensee administrative requirements. The inspector will review the resolution and close out of all test exceptions in future inspections.



3. Unresolved Items

Unresolved items are matters about which more information is required to ascertain whether they are acceptable items, items of noncompliance, or deviations. Unresolved items disclosed during the inspection are discussed in Section 2.

4. Exit Interview

At the conclusion of the site inspection on July 6, 1984, an exit meeting was conducted with the licensee's senior site representative (denoted in paragraph 1). The findings were identified and previous inspection items were discussed. At no time during this inspection was written material provided to the licensee by the inspector.

APPENDIXSTARTUP TEST RESULTS EVALUATION

1. ST-1.7 "Chemistry Data - Power Ascension Tests" Revision 1,  
Test Implemented July 6, 1984.
2. ST-2.1 "Startup Test Program Radiation Survey" Revision 5,  
Test Implemented July 4, 1984.
3. ST-5.7 "Scram Timing Selected Rods During Planned Scrams" Revision 3,  
Test Implemented July 5, 1984.
4. ST-10.2 "IRM-APRM Overlap Verification" Revision 2,  
Test Implemented June 28, 1984.
5. ST-11.2 "LPRM Calibration W/O Process Computer" Revision 2,  
Test Implemented July 5, 1984.
6. ST-12.2 "High Power APRM Calibration" Revision 2,  
Test Implemented July 4, 1984.
7. ST-19.1 "BUCLC Calculation" Revision 2,  
Test Implemented July 4, 1984.
8. ST-22.3 "Pressure Regulator Test - Bypass Valves Controlling" Revision 1,  
Test Implemented June 29, 1984.
9. ST-23.1 "Feedwater System Startup Controller Level Step" Revision 1,  
Test Implemented June 29, 1984.
10. ST-28.1 "Shutdown and Cool Down Demonstration" Revision 3,  
Test Implemented July 5, 1984.
11. ST-28.2 "Reactor Scram from Outside the Control Room" Revision 2,  
Test Implemented July 5, 1984.
12. ST-37.1 "Gaseous Radwaste Data Collection" Revision 2,  
Test Implemented June 29, 1984.