U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-387/82-39

Docket No. 50-387

License No. NPF-14 Priority - Category B

Licensee: Pennsylvania Power and Light Company

Allentown, Pennsylvania

Facility Name: Susquehanna Steam Electric Station, Unit No. 1

Inspection at: Berwick, Pennsylvania

Inspection conducted: September 20-24, 1982

Inspectors: C Petrone 10/12/82
C. Petrone, Reactor Inspector date signed

N Blumberg 10/14/82
N. Blumberg, Reactor Inspector date signed

Approved by: LH Bettenhausen 10/14/82
L. H. Bettenhausen, Chief, Test Program Section date signed

Inspection Summary: Inspection Report No. 50-387/82-39

Areas Inspected: Routine, unannounced inspection of control of procedures and calibration of safety related instrumentation; surveillance testing; radiological controls; and licensee's response to an alert. The inspection involved 62 inspector hours on site by two region based inspectors.

Results: One violation: Failure to follow a written procedure for control of safety or quality related computer software.

DETAILS

1.0 Persons Contacted

1.1 Pennsylvania Power & Light Company

*T. Baileys	Fire Protection Engineer
*T. Butler	Instrumentation and Controls/Computer Supervisor
M. Cervese	ISG System Engineer
*F. Eisenhuth	Sr. Compliance Engineer
R. Falkner	Sr. Project Engineer
*J. Green	Quality Assurance Supervisor
*R. Harris	Sr. Licensing Specialist
A. Iorfida	Integrated Startup Group Supervisor
*H. Keiser	Plant Superintendent
*G. Muczynski	Electrical Maintenance Supervisor
W. Lee	Computer Hardware Technician
P. McGregor	Computer Engineer
F. Natale	Computer Engineer (General Electric)
L. O'Neil	Technical Supervisor
J. Rhodes	Startup Engineer (General Electric)
H. Saeger	Lead Software Engineer
M. Schilling	Construction and Instrumentation Specialist

1.2 Nuclear Regulatory Commission

*S. Ebneter	Engineering Programs Branch Chief, Region I
*G. Rhoads	Sr. Resident Inspector

*indicates those present at combined exit meeting (82-39 and 82-40) on September 24, 1982.

2.0 Plant Computer System - Instrumentation

The plant computer system consists of a Display Control System (DCS) and a Performance Monitoring System (PMS) which includes the NSSS Computer System, Balance of Plant (BOP), and Historical Recording and Program Development (HRPD). The DCS is used to monitor unit operation, generate graphic displays for operator use and to optimize operator surveillance. The PMS is used to perform BOP calculations, log data, make historical records, generate graphic displays and alarm status summary displays, and to provide off line capabilities. The NSSS computer system is used to provide a determination of core thermal performance; to improve data reduction, accounting, and logging functions; and to supplement procedural requirements.

The three computer systems, DCS, PMS, and NSSS (actually part of the PMS) are classified as not related to safety. The NSSS portion of the computer is similar in function to the process computer at other Region I BWR's but the DCS and PMS (other than the NSSS) have no counterpart at other Region I BWR's.

The inspector examined the actions taken by the licensee to check out, calibrate, program, and maintain the computer systems. Particular attention was focussed on those computer displays, data, calculations, or records that have safety significance or are required by Technical Specifications (TS).

The inspector reviewed the records of the computer acceptance tests, reviewed the licensee's procedures for control of computer provided information, reviewed the calibration procedure and records for selected computer points, and discussed various aspects of the computer operation with licensee personnel including reactor operators, instrumentation and control technicians, operator training instructors, and computer programmers.

2.1 The inspector reviewed the following procedures and test results to verify that the computer systems had been checked out satisfactorily.

- Procedure A31.2, Rev. 1, "Computer," was completed on October 15, 1981. This procedure was used to demonstrate proper operation including the ability of the Display Control System (DCS) to monitor unit operation and generate video displays for operator use and the ability of the Performance Monitoring System (PMS) to log data, make historical records, generate video displays and generate alarm status summary displays. The inspector reviewed the procedure for technical adequacy and noted that:

  - Prerequisites were complete.
  - Appropriate precautions were included.
  - Verification signoffs were complete.
  - Temporary changes were technically correct and adequately controlled.

The inspector noted that the checkoffs were missing on table 3-9, pages 7-7 through 7-14, although the verification signatures had been made. The licensee's representative acknowledged the errors and contacted the engineer who performed the tests. This engineer verified that these steps had been performed satisfactorily and that the checkoffs had been omitted inadvertently. This appears to be an isolated error since the inspector's review of this document revealed no further discrepancies. The inspector had no further questions.

- The inspector reviewed TP 1.18, "Computer Input Verification," Rev. 3, which was used by the licensee to demonstrate that the Process Computer System can accept a field input and display it on an output device. It was used to verify that each field input (current, voltage, or digital input) is translated to the proper units (psi, degrees, percent, etc.) and is displayed correctly on each applicable Cathode Ray Tube (CRT) format. The licensee performed this procedure for each computer point (each computer point represents a monitored parameter, e.g. temperature, pressure, etc.) that is entered in the system.

The inspector reviewed a sample of approximately 10% of this data for technical adequacy. No discrepancies were identified.

2.2 The inspector reviewed the following documents to determine if adequate controls existed to insure that safety related data obtained from the computer was accurate. These documents included:

- DC 120.0, Computer Codes Control, Revision 0, October 19, 1981

- DC 125.0, Process Computer Control and Monitoring Programs, Revision 1, September 10, 1982

- AD-QA-625, Control of SSES Plant Computer Systems Hardware and Software, Revision 1, August 24, 1982

- NDI-QA-8.2.1, SSES Computer Software Quality Assurance Program, Revision 0, February 10, 1982

Engineering Procedure NDI-QA-8.2.1, "SSES Computer Software Quality Assurance Program," establishes the need for an SSES Computer Software QA listing (C-List) for all computer software which performs safety related or quality related functions. Additionally, NDI-QA-8.2.1 provides a system of controls for quality related computer software. The inspector determined that a C-listing did not exist nor were the controls established by NDI-QA-8.2.1 in effect at the time of the inspection. A licensee representative stated that a previous determination had been made that information displayed on Control Room CRT's was not safety or quality related; however, a review was in progress to determine if any computer points were in the scope of NDI-QA-8.2.1.

The inspector verified that Emergency Core Cooling System (ECCS) parameters were not displayed on the CRT's. However, the inspector determined that certain computer points were used to verify portions of the following Technical Specification Surveillances:

-- SO-00-007, "Daily Surveillance Operating Log." This surveillance uses computer CRT display for verification of drywell temperature, percent core flow, and individual rod position indication.

-- SO-56-002, "Exercising Control Rods Weekly for Operability." This surveillance uses the computer CRT display for verification of individual rod position indication.

-- In addition, safety related software for a separate Control Room computer, the Suppression Pool Temperature Monitoring System (SPOTMOS), was not controlled in accordance with NDI-QA-8.2.1.

The inspector informed the licensee that the requirements of NDI-QA-8.2.1 are applicable to the above computer points since they are used to verify Technical Specification Surveillance requirements. Additionally, the inspector noted that other computer points displayed on the Control Room

CRT's, although not used for Technical Specification verification, may also be quality related.

Failure to maintain a computer software C-list and control quality related computer software in accordance with NDI-QA-8.2.1, is contrary to 10 CFR 50 Appendix B, Criterion V, and NDI-QA-8.2.1 and constitutes a violation (387/82-39-01).

2.3 The inspector reviewed the licensee's shift and daily surveillance logs for data required by Technical Specification that is obtained from the computer CRT displays. The selected data points were called up on CRTs and compared to the values obtained from the hard-wired plant instrumentation. The correlation between the CRT data and the hard-wired data was generally within tolerance. However, no formal requirements existed to perform calibration of CRT displays during Instrument Loop Calibration Checks done in accordance with IC-LC-001. A review of the Instrument Calibration Sheets for Recirculation Jet Loop Flow and Drywell Temperature Calibration revealed that the I&C technicians had been checking the CRT display for accuracy when performing the loop calibration of the hard-wired meters and chart recorders. However, they appeared to be doing this because they considered it good shop practice and not because it is required by procedure. Those computer data points which are used in satisfying Technical Specification surveillances should be added to the "C-list" (see paragraph 2.2) and be adequately controlled. Instrument loop calibration checks for those items identified in the "C-list" should also include a check of the CRT display. This item is unresolved and will be reviewed after the licensee has established the "C list." (387/82-39-02)

SO-00-007, "Daily Surveillance Operating Log," allows the option of monitoring drywell temperatures from either the computer CRT displays or from the Control Room drywell temperature recorders. During comparison of CRT drywell temperature readings to Control Room recorder drywell temperature readings, the inspector observed that Control Room operators had difficulty reading the data points specified in SO-00-007.

This difficulty appeared to be caused by the following:

-- The four temperature data points on each recorder chart were neither numbered nor color coded.

-- There was no correlation between the identification chart below the recorder defining drywell levels at which temperatures were taken and data points on the recorder.

-- There was no correlation between this chart and data points as specified in log SO-00-007.

-- The recorder scale was from 50° F to 350°F in 7.5° increments, while the recorder chart paper had a 0-100 scale. Hence, once removed from the recorder, this chart paper would not provide a usable record.

-- Additionally, although not related to readability, the two drywell temperature recorders had no identification labels.

The licensee stated the above discrepancies would be corrected. This item is unresolved pending licensee action and subsequent NRC:RI review (387/82-39-03).

2.4 Shortly after achieving initial criticality on September 10, 1982, the reactor scrammed due to a IRM UPSCALE HIGH HIGH indication when the IRM range switch was not turned to the next higher range in time. The inspector discussed this with the operator involved and with licensee management. They indicated that the error occurred because the format of the IRM indication on the CRT (which reads from 0-100 percent) is different from the hard-wired IRM panel meters which read 0-40 and 0-125. At the exit meeting, the inspectors discussed the possibility of resolving the differences between the two IRM displays to reduce the possibility of inadvertent scrams. The Plant Superintendent agreed to investigate the problem and seek a suitable resolution. The inspector had no further questions on this item.

3.0 Transversing In-Core Probe (TIP) Alignment

3.1 The inspector reviewed procedure HF-78-003, "Tip Alignment and Tip Plotter Adjustment," which is used to determine if a readjustment of the core top (NCFT) and core bottom (NCCB) location for TIP's is necessary at rated temperature, to adjust the TIP X-Y Plotter to start and stop at the correct core locations, and to edit specific process computer data arrays to obtain TIP system data. The inspector reviewed this procedure for technical adequacy and conformance to Technical Specifications.

3.2 The inspector observed portions of the performance of TIP alignment and verified that:

- Prerequisites were completed and verified.
- The reactor was at rated temperature as required.
- Personnel were qualified.
- Work was being performed in accordance with the procedure.
- Test results were satisfactory.

No violations were identified.

4.0 Radiological Controls

On several occasions, the inspector observed licensee personnel walk through a designated radiological frisking station located at an exit to the upper level turbine building. The senior resident inspector contacted the health physics supervisor who stated that there was actually no loose contamination on the turbine building floor and that the frisking stations were placed there for training purposes. At the exit meeting, the inspector stated that the licensee's employees appear to be developing the habit of walking through frisking stations and this is counterproductive from a radiological control training standpoint. Alternatives such as the requirement to frisk be enforced or that the frisking station be removed were discussed. The senior resident inspector subsequently noted that the frisking station had been removed. Personnel exiting the turbine building now frisk at the dosimetry issue station at the access control point. The inspector had no further questions

5.0 Emergency Service Water System (ESW) Incident - Electrical Fire

During this inspection, a fire occurred in electrical panels in the ESW pump house. The fire disabled one train of ESW. The licensee called a Site Alert during the incident. However, the reactor remained operating for low power testing throughout. During this alert, the region-based inspectors provided assistance to the Senior Resident Inspector.

Specifics of this incident and NRC response are further detailed in Inspection Reports 50-387/82-32 and 50-387/82-40.

6.0 Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable, deviations, or violations. Unresolved items identified in this report appear in paragraph 2.3.

7.0 Exit Meeting

At an exit meeting on September 24, 1982 the inspectors presented the scope and findings of this inspection to those persons identified in paragraph 1.