U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Report Nos. 50-387/89-34; 50-388/89-33

License Nos. NPF-14; NPF-22

Licensee: Pennsylvania Power and Light Company
2 North Ninth Street
Allentown, Pennsylvania 18101

Facility Name: Susquehanna Steam Electric Station

Inspection At: Salem Township, Pennsylvania

Inspection Conducted: November 12, 1989 - December 23, 1989

Inspectors: G. S. Barber, Senior Resident Inspector, SSES
J. R. Stair, Resident Inspector, SSES

Approved By: _____ 1/9/90
T. Kenny, ~~Acting~~ Chief Date
Reactor Projects Section No. 2A,

Inspection Summary:

Areas Inspected: Routine inspections were conducted in the following areas: plant operations, physical security, plant events, surveillance, and maintenance.

Results: During this period, Operations Department personnel generally conducted activities in a professional manner and operated the plant safely. Routine review of maintenance and surveillance activities noted good control and performance.

A Unit 1 Reactor Water Cleanup (RWCU) isolation occurred on Unit 1 due to a failed pump seal. The system isolated on high temperature. RWCU pump seal failures have been a recurring problem.

An ESF walkdown was conducted of the Unit 2 Core Spray system. All major flowpath valves were properly positioned. Minor discrepancies noted by the inspector were corrected by the licensee.

The NRC granted enforcement discretion for Reactor Core Isolation Cooling (RCIC) and High Pressure Coolant Injection (HPCI) flow surveillances. The installation of a valve cage in the full flow test valves prevented achieving adequate flow at a reactor pressure of 150 psig. Adequate pump performance was verified against the pump versus flow curves and confirmed by acceptable test results at 920 psig. Anticipation of this flow reduction should have been an integral part of Pennsylvania Power and Light's modification process.

A 10 CRF 21 report was made on incomplete welds in structural tubing used to support safety related inverter racks. The supplier and manufacturer were notified.

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DETAILS

1.0 Introduction and Overview

1.1 NRC Resident Staff Activities

The purpose of this inspection was to assess licensee activities at Susquehanna Steam Electric Station (SSES) as it related to reactor safety and worker radiation protection. Within each area, the inspectors documented the specific purpose of the area under review, scope of inspection activities and findings, along with appropriate conclusions. This assessment is based on actual observation of licensee activities, interviews with licensee personnel, measurement of radiation levels, independent calculations and selective review of applicable documents.

1.2 Unit 1 Summary

Unit 1 operated at or near full power for the entire inspection period. Scheduled power reductions were conducted during the period for control rod pattern adjustments, surveillance testing, and maintenance. On November 13, a Reactor Water Cleanup System (RWCU) Isolation occurred due to a failed "B" RWCU pump seal. See Section 2.2 for details. No additional events occurred in Unit 1 during the inspection period.

1.3 Unit 2 Summary

The unit's third refueling outage was considered completed at 1:13 p.m. on November 23 when the generator output breakers were closed, connecting the main generator to the Pennsylvania - New Jersey - Maryland (PJM) System Grid. Power ascension commenced with 100 percent power being reached on November 30. Power was reduced to 45 percent over the weekend of December 9 to accommodate single loop testing. Full power was maintained for the remainder of the inspection period except for a reduction to 60 percent from 2:30 a.m. on December 16 to 7:00 a.m. on December 17 in order to repair a tube leak in the "D" waterbox of the main condenser intermediate pressure section.

A failed Reactor Core Isolation Cooling (RCIC) flow surveillance test during startup on November 16 led to a request for enforcement discretion. The NRC granted enforcement discretion pending subsequent satisfactory operation and testing of both RCIC and High Pressure Coolant Injection Systems. See Section 6.0 for details. A Reactor Water Cleanup System (RWCU) isolation occurred on December 14, due to a failed relay. See Section 2.3 for details.

2.0 Routine Periodic Inspections

2.1 Scope of Review

The inspectors periodically inspected the facility to evaluate the safety of plant operation and to determine the licensee's conformance with the general operating requirements of the Technical Specifications (TS) in the following areas:

-- review of selected plant parameters for abnormal trends;

-- plant status from a maintenance/modification viewpoint, including plant housekeeping and fire protection measures;

-- control of ongoing and special evolutions, including control room personnel awareness of these evolutions;

-- control of documents, including logkeeping practices;

-- implementation of radiological controls;

-- implementation of the security plan, including access control, barrier integrity, and badging practices;

-- control room operations during regular and backshift hours, including frequent observation of activities in progress, and periodic reviews of selected sections of the unit supervisor's log, the control room operator's log and other control room daily logs;

-- followup items on activities that could affect plant safety or impact plant operations;

-- areas outside the control room; and,

-- selected licensee planning meetings.

The inspectors conducted weekend/holiday inspections on November 12 from 2:15 p.m. to 7:15 p.m., November 19 from 10:40 a.m. to 1:40 p.m., November 19 from 11:00 a.m. to 2:00 p.m., November 24 from 7:00 a.m. to 3:45 p.m., and on December 22 from 7:00 a.m. to 3:45 p.m..

The inspectors reviewed the following specific items in more detail:

2.2 RWCU System Isolation - Unit 1

The licensee had been monitoring a leaky seal from the "B" Reactor Water Cleanup (RWCU) pump for a period of approximately 3 weeks when a fire alarm was received for the RWCU room. This alarm was followed by the automatic tripping of the "B" RWCU pump. Subsequently, a RWCU system Division II isolation occurred on high area temperatures at 2:11 p.m., November 13. The RWCU outboard isolation valve (HV-G33-F004) closed, as expected. Differential temperature isolation logic actuation also occurred. The pump was manually isolated by maintenance personnel at 3:00 p.m.. The resident inspector was notified at 2:20 p.m. and an ENS call was made at 5:26 p.m., November 13 per 10 CFR 50.72.

The root cause of this event was component failure/design inadequacy. The licensee determined that the pump's mechanical seal failed which filled the RWCU pump room with high temperature steam. The pump was subsequently overhauled and retested satisfactorily. There have been numerous RWCU pump seal leaks over the past several years. The licensee is working with Union pump to upgrade the seal materials to lengthen their service life. New seal materials are being considered, as is, the installation of a seal-less pump. Continued licensee attention to this problem is necessary. The inspector had no further questions on this seal failure.

2.3 RWCU System Isolation - Unit 2

The licensee was in the process of performing Instrument and Control (I&C) surveillance SI-279-306, 18 Month Calibration test of Main Steam Line (MSL) Radiation Monitor Channel RIS-D12-2K603A when a Reactor Water Cleanup (RWCU) isolation occurred. A section of the procedure creates a one-half Main Steam Isolation Valve (MSIV) isolation signal and a one-half scram signal. Step 6.6.13 has the plant control operator (PCO) attempt to reset the one-half scram and one-half MSIV isolation. When the PCO attempted to reset the Division MSL isolation signal, the RWCU inboard isolation valve (F001) isolated unexpectedly.

In response to the event, the PCO immediately closed the RWCU outboard isolation valve (F004). An investigation into the cause of the event discovered a blown fuse (B21H-F17) and a failed relay (B21H-K15B). Both the relay and fuse were replaced, the isolation signal reset, and the RWCU system returned to service.

Further investigation into the root cause of the event by the licensee, concluded that relay B21H-K15B was on the verge of failure and that the attempt to reset the MSIV logic caused a minor power fluctuation in the RWCU isolation logic since they share a common power source. This power fluctuation caused B21H-K15B to fail due to an internal short which caused

fuse F17 to blow. Fuse F17 supplies power to the RWCU isolation logic, therefore its failure resulted in a loss of power to the RWCU isolation logic which caused F001 to close.

No inadequacies in the licensee's response to this event were noted.

3.0 Surveillance and Maintenance Activities

On a sampling basis, the inspector observed and/or reviewed selected surveillance and maintenance activities to ensure that specific programmatic elements described below were being met. Details of this review are documented in the following sections.

3.1 Surveillance Observations

The inspector observed and/or reviewed the following surveillance tests to determine that the following criteria, if applicable to the specific test, were met: the test conformed to Technical Specification requirements; administrative approvals and tagouts were obtained before initiating the surveillance; testing was accomplished by qualified personnel in accordance with an approved procedure; test instrumentation was calibrated; Limiting Conditions for Operations were met; test data was accurate and complete; removal and restoration of the affected components was properly accomplished; test results met Technical Specification and procedural requirements; deficiencies noted were reviewed and appropriately resolved; and the surveillance was completed at the required frequency.

These observations and/or reviews included:

-- SI-278-209F, Average Power Range Monitor (APRM) F Calibration and Functional Test, performed on December 4, 1989.

-- SO-024-001B, Monthly Diesel Generator Operability Test of the "B" Diesel Generator, performed on December 5, 1989.

-- SE-024-B04, 18 month Diesel Generator 1B Auto Start on ECCS Actuation Test Signal, performed on December 5, 1989.

No unacceptable conditions were identified.

3.2 Maintenance Observations

The inspector observed and/or reviewed selected maintenance activities to determine that the work was conducted in accordance with approved

procedures, regulatory guides, Technical Specifications, and industry codes or standards. The following items were considered, as applicable, during this review: Limiting Conditions for Operation were met while components or systems were removed from service; required administrative approvals were obtained prior to initiating the work; activities were accomplished using approved procedures and quality control hold points were established where required; functional testing was performed prior to declaring the involved component(s) operable; activities were accomplished by qualified personnel; radiological controls were implemented; fire protection controls were implemented; and the equipment was verified to be properly returned to service.

These observations and/or reviews included:

-- Troubleshooting and Replacement of Continuity Meter Lamp of "B" Standby Liquid Control per WA S91469, performed on December 4, 1989.

-- Inspection of the "C" Diesel Generator Engine due to High Vibrations, per WA S94878.

No inadequacies were noted.

4.0 Licensee Reports

4.1 In-office Review of Licensee Event Reports

The inspector reviewed Licensee Event Reports (LERs) to verify that details of the event were clearly and accurately reported, and to ensure that the licensee addressed the event in sufficient detail to prevent a recurrence. The inspector also determined whether further information was required from the licensee, whether generic implications were involved, and whether the event warranted onsite followup. The following LERs were reviewed:

Unit 1

89-026 ESF Actuation due to Electrical Transient when Radwaste Transformer failed. This event was reviewed in NRC Inspection Report 50-387/98-31.

Unit 2

89-005-01 Inadvertent Cross-Tie of Reactor Building HVAC Zones I and III. This event was reviewed in NRC Inspection Report 50-388/89-13.

89-006-01 Unplanned Exposure of Contractor Employee. This event was reviewed in NRC Inspection Report 50-388/89-25.

89-013 Inadvertent Opening of Main Turbine Stop Valves as a Result of Technician Error Causes an MSIV Isolation Signal. This event was reviewed in NRC Inspection Report 50-388/89-29.

89-014 Unplanned ESF Actuation Occurred During Surveillance Testing due to Procedural Deficiency. This event was reviewed in NRC Inspection Report 50-388/89-29.

89-015 "B" Standby Gas Treatment System Automatic Start. This event was reviewed in NRC Inspection Report 50-388/89-24.

No inadequacies were noted.

4.2 Significant Operating Occurrence Reports

The licensee uses Significant Operating Occurrence Reports (SOORs) for problem identification and tracking, short and long term corrective action determinations, and reportability evaluations. The licensee also uses SOORs to document and bring to closure plant events and problems identified that may not warrant an LER.

The inspectors reviewed the following SOORs during the period to ascertain whether: additional followup inspection effort or other NRC response was warranted; corrective action discussed in the licensee's report appeared appropriate; generic issues were assessed; and, prompt notification was made, if required:

1-89-339, 1-89-343, 1-89=344, 1-89-345, 1-89-346, 1-89-347, 1-89-348, 1-89-349, 1-89-350, 1-89-351, 1-89-352, 1-89-353, 1-89-354, 1-89-355, 1-89-356, 1-89-357, 1-89-358, 1-89-359, 1-89-360, 1-89-361, 1-89-362, 1-89-363, 1-89-364, 1-89-365, 1-89-366, 1-89-367, 1-89-369, 1-89-370, 1-89-371, 1-89-372, 1-89-373, 1-89-374, 1-89-375, 2-89-204, 2-89-205, 2-89-206, 2-89-207, 2-89-208, 2-89-210, 2-89-211, 2-89-212, 2-89-213, 2-89-214, 2-89-215, 2-89-216, 2-89-217, 2-89-218, 2-89-219, 2-89-220, 2-89-221, 2-89-222, 2-89-223, 2-89-224, 2-89-225, 2-89-226, 2-89-227, 2-89-229, 2-89-230, 2-89-231, 2-89-232.

No unacceptable conditions were identified.

The following SOORs required inspector followup:

1-89-342 documented a Reactor Water Cleanup System (RWCU) Isolation due to a pump seal failure. See Section 2.2 for details.

2-89-203 documented a failed Reactor Core Isolation Cooling System (RCIC) flow surveillance due to the inability to exhibit the required flow through the flow test line. See Section 6.0 for details.

2-89-228 documented a RWCU System Isolation due to a failed relay. See Section 2.3 for details.

5.0 ESF Walkdown - Unit 2 Core Spray

The inspector performed an independent verification of the Unit 2 Core Spray (C.S.) system lineup by performing a complete walkdown of accessible portions of the system on November 16. The walkdown included the following:

-- Confirmation that the licensee's system check-off list matched plant drawings and as-built configurations.

-- Identification of equipment conditions.

-- Verification of properly valved-in instrumentation.

-- Verification of proper valve position and locking mechanisms.

-- Verification of good housekeeping in the area of the pump rooms.

The following discrepancies were noted:

-- An "LLRT in Progress" tag was found on 252-F010C, C.S. pump "C" Minimum Flow Isolation Valve, with the C.S. system returned to service.

-- A discarded pair of white coveralls was found in the mezzanine area of "A & C" C.S. pump room.

The Shift Supervisor was informed of the discrepancies who took appropriate action to remove the tag and correct the housekeeping problem. The inspector found no discrepancies in the portion of the valve line up that was verified. The system had just been returned to service following outage work. All major flowpath valves were properly aligned for emergency operation.

During the review of the system check-off lists the inspector identified that the C.S. loop outboard injection valve, HV-252-F004, was not found on the mechanical check-off list. The upstream valve, HV-252-F005, inboard injection valve, was on the list.

The inspector discussed this concern with the licensee and it was explained that the check-off lists were recently revised and the HV-252-F004 valve now appears on the electrical check-off list, exclusively. The reason for the HV-252-F005 valve being left on the mechanical check-off list was to identify it separately as a containment isolation valve. The inspector verified it was on the containment isolation valve listing. No unacceptable conditions were identified.

6.0 Enforcement Discretion for RCIC and HPCI 150 psig Surveillances

The licensee identified that the 150 psig full flow surveillance for Reactor Core Isolation Cooling (RCIC) was performed unsatisfactorily at 11:15 p.m., November 16. The RCIC surveillance (SO-250-005) was performed at 159 psig during the Unit 2 startup. The full flow test valve (F022) was fully opened with the RCIC turbine running at 2900 rpm. The flow that was achieved was 530 gpm versus a minimum acceptable flow of 600 gpm. Valve lineups were reviewed for potential leakage paths. None were found. The licensee's Nuclear Plant Engineering (NPE) reviewed a design change made to the F022 valve during the recent outage to prevent valve chattering at near full closure positions. NPE concluded that the installed valve cage severely restricted the test flow but would not impede the actual injection flow to the vessel under accident conditions since safety injection is through a different line. Comparison between the current pump performance and the head versus flow curve of the pump showed the pump was operating as designed. The licensee's analysis proved the performance of the RCIC pump was acceptable. The licensee expected the same problem with High Pressure Coolant Injection (HPCI) since its full flow test valve received a similar modification.

The inspectors responded to the site on November 19 to review the licensee's conclusion. The last two RCIC and HPCI quarterly surveillances were reviewed, as was, the last 18 month RCIC and HPCI 150 psig and 920 psig surveillance tests. The results of these surveillances were reviewed for degrading trends. None were found. The inspectors noted that the licensee's conclusions regarding consistent pump performance were appropriate. No inadequacies were noted.

Nonetheless, a compliance issue remained with respect to Technical Specification (TS) Surveillance requirements. To address this issue, the Inspectors, Region I personnel, and NRC Licensing personnel were contacted. A telephone conference call was held at 2:00 p.m., November 17. The licensee presented their technical justification to the NRC to request enforcement discretion from TS 4.5.1.C.2 and 4.7.3.C.2. This discretion was needed until an Emergency Amendment request could be prepared and submitted. This request was documented in licensee correspondence (PLA 3300). Verbal NRC approval was granted at 5:00 p.m., November 17. With

this approval, a one time procedure change was prepared for both the RCIC and HPCI 150 psig surveillances to waive meeting the 150 psig acceptance criteria pending satisfactory completion of the 920 psig surveillances. The subsequent 920 psig surveillance for HPCI and RCIC were satisfactory. Anticipation of this flow reduction should have been an integral part of the licensee's modification process. The inspector had no further questions on this issue.

7.0 10CFR Part 21 Report - Incomplete Welds on Structural Tubing

On December 1, 1989 the licensee contacted the inspector to inform him of a material deficiency which was determined to be reportable under 10 CFR 21. On September 15, 1989, during fabrication of an inverter rack at Susquehanna Steam Electric Station (SSES), a crack was discovered in the longitudinal butt welded joint of a section of tube steel being used to construct the rack. Further inspection showed that incomplete welds existed in this material. The material had been used in a number of recent installations at SSES.

The suspect material is cold formed welded structural tubing manufactured by Welded Tube Company of America, Chicago, Illinois. It was purchased from Hub, Inc., Tucker, Georgia. Nineteen 20-foot lengths (380 ft.) were purchased. The suspect material is all 4" x 4" x 1/4" ASTM A500 Gr. B, Q, galvanized per ASTM A153, Heat No. Y65143. The licensee believes that this problem is limited to Heat No. Y65143.

The safety impact of incomplete welds in this tube steel is a significant reduction in its strength. The affect on axial strength is minimal. However, the affect on torsional and bending strength may be significant. The material is used as structural support for safety-related components.

Of the 380 linear feet of suspect tube steel purchased, 183 ft. has been placed on hold for return to the supplier. The supplier and manufacturer were notified that PP&L was evaluating this material for reportability under Part 21. The supplier indicated that all remaining suspect material was being held pending PP&L's determination. PP&L has no specific information on the use of this suspect material at other facilities. PP&L completed their review and concluded that the flawed welds were reportable under 10 CFR 21. A written followup report to the initial verbal report was generated.

The suspect material had been installed in six recent modifications. Calculations performed by PP&L showed that the material strength is adequate for use-as-is. However, PP&L repaired 21 conduit supports in

three of these installations to assure that full rated capacity is available in the event additional loads are ever added to these supports. These repairs are in the form of a plate welded along the side of the tubing where the longitudinal joint exists and were completed on December 15, 1989.

No inadequacies in the licensee's response were identified.

8.0 Resident Monthly Exit Meeting

The inspector discussed the findings of this inspection with station management at the conclusion of the inspection period. Based on NRC Region I review of this report and discussions held with licensee representatives, it was determined that this report does not contain information subject to 10 CFR 2.790 restrictions.