U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-387/89-14

Docket No. 50-387

License No. NPF-14

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

Facility Name: Susquehanna Steam Electric Station Unit 1

Inspection At: Berwick, Pennsylvania

Inspection Dates: May 22-26, 1989

Inspector: _____ 6/8/89
R. W. Winters, Reactor Engineer, MPS, EB, DRS, Region I — date

Approved by: _____ 6/8/89.
S. K. Chaudhary, Chief, Materials & Processes Section, Engineering Branch, DRS, RI — date

Inspection Summary: Routine unannounced inspection on May 22-26, 1989 (Report No. 50-387/89-14).

Areas Inspected: The inservice inspection program was inspected. In addition the results of the water chemistry program were reviewed.

Results: No violations or deviations were identified.

DETAILS

1.0 Persons Contacted

Pennsylvania Power and Light Company

* J. Blakeslee, Assistant Superintendent of Plant
* R. Byram, Superintendent of Plant
  N. Fedder, Inservice Inspection Specialist
  M. Hober, Senior Engineer, Nuclear Plant Engineering
  R. Lesko, Inservice Inspection Analyst
* J. Lindberg, Nuclear Plant Engineering, Project Scientist
* R. Prego, Quality Assurance Supervisor, Operations
* D. Roth, Senior Compliance Engineer
* G. Stanley. Assistant Superintendent, Outages
* T. Steingass, Inservice Inspection Supervisor
* H. Webb, Superintendent, Nuclear Maintenance Services
  J. Wolfer, Plant Chemist

General Electric Company, Nuclear Energy Business Operations

M. Stamm, Supervisor, Inservice Inspection

United States Nuclear Regulatory Commission

* S. Barber, Senior Resident Inspector

* Denotes those attending the exit meeting.

The inspector also contacted other administrative and technical personnel during the inspection.

2.0 Introduction

The Susquehanna Steam Electric Station (SSES) Unit 1, is a 1100 megawatt Boiling Water Reactor plant. The operating license was issued July 17, 1982, and commercial operation commenced June 8, 1983. The first ten year interval of the Inservice Inspection (ISI) is being performed in accordance with the requirements of the ASME Boiler and Pressure Vessel Code, 1980 Edition, Winter 1980 Addenda. The plant is currently in the second period of the first interval. This ten year program was developed by the Nuclear Plant Engineering Department of the licensee's Corporate Engineering Group.

3.0 References/Requirements

The following references and requirements are applicable to the inservice inspection program of the plant:

-- 10 CFR 50.55a(g) Inservice Inspection Requirements

-- IST-T-106.0, Revision 1, Inservice Inspection Program Plan and Relief Requests

-- Final Safety Analysis Report, paragraph 6.6, Inservice Inspection of ASME Class 2 and 3 Components.

-- NUT-1, Revision 0, Manual Ultrasonic Examination of Similar and Dissimilar Metal Welds for IGSCC

-- NLP-1, Revision 3, Procedure for Color Contrast Liquid Penetrant Examination

-- ISI-T-001.0, Revision 0, Inservice Inspection for Susquehanna Steam Electric Station

-- ISI-T-107.0, Revision 8, Inservice Inspection Technical Document for Component Listing and ISI Ten Year Plan

-- ISI-T-108.0, Revision 2, Inservice Inspection Technical Document for ISI Master Selection Document

4.0 Inservice Inspection

Program Review

The licensee has developed an organization dedicated to the inspection and maintenance of both units. This organization has sections responsible for hangers, piping and components, snubbers, and the erosion-corrosion program. The sections perform the required inspections and are further responsible for initiating the corrective action to get unacceptable items repaired or replaced as required. Actual inspections are performed by contractors under the direct supervision of the licensee's ISI group using either licensee procedures or procedures approved by the licensee. Reporting nomenclature has been standardized to provide continuity between inspections performed in different periods.

The licensee is currently in the second period of the first interval of the ISI program. The inspector reviewed the examinations performed to date and determined that the licensee had performed the required testing and was making an effort not to defer examinations until the end of the interval.

Implementation

The inspector reviewed selected work packages prepared for ISI inspections during this outage and discussed the implementation of these packages with responsible licensee and contractor personnel. In the preparation of the work packages the licensee includes area maps

showing the component locations to aid the inspectors in finding the items to be inspected. In addition, contractor personnel familiar with the plant are assigned as "tour guides" to lead inspectors directly to the components to be tested. The objective of these maps and guides was to reduce exposures by minimizing the time inspectors spent in radiation areas. In addition to the maps, when practical, the components to be tested were conspicuously flagged to further reduce lost time looking for components and assure that errors were not made inspecting the wrong items.

The inspector reviewed selected work packages generated for controlling the ISI process. Typically these packages contained the following:

-- The Inspection Report listing the specific component to be inspected, type of inspection, inspection procedure with acceptance standards, and inspection equipment required. This document is also used to record the results of the examination.

-- The location map showing building, elevation, area, room number, and floor plan indicating the component location within the room.

-- The hanger identification isometric drawing

-- A Data Correlation Statement showing how the present condition compared to preservice or prior inservice inspection results.

The inspector selected a visual test package that had a rejectable condition, and determined that in addition to the above this package contained the following:

-- The NCR 89-0241 with a description of the problem (inadequate thread engagement and a loose nameplate).

-- A sketch of the component (snubber) with the defective areas marked.

-- The work authorization appropriately approved for work and closed after completion. Quality Control hold points had been established at appropriate operations.

-- An Equipment Release Form approved by operations to assure that the control room personnel were aware of the status of the snubber being repaired.

-- A document describing the housekeeping requirements during repair work

-- The material issue document for the repair parts.

-- The Quality Control Inspection Record for the hold points required by the Work Authorization. This inspection record also noted that the housekeeping requirements were acceptable.

Inspection Status

The licensee maintains a computer data base that includes all of the components in the ISI program. In addition to the component identification the data base includes the Code category, a description of the component type, e.g. pipe to pipe, examination type, (surface or volumetric), isometric drawing number, procedure number, examination number (for tracking), material, scaffolding required, diameter, thickness, loop, calibration block number, and plant location. This data base can also be used to track the progress of the inspection by printing the status with completion dates for various operations, e.g. date released to the contractor, inspection complete, data review complete, and data accepted. As the outage nears completion, missing dates are conspicuous and appropriate actions can be taken to assure that no planned component inspections are inadvertently missed.

Personnel Certifications

The inspector reviewed the personnel certification records for selected individuals from both the licensee's organization and the ISI contractor. These records were determined to be in accordance with SNT-TC-1A.

Conclusions

The licensee has developed a dedicated ISI group that provides continuity to the Inservice Inspection Program by having individuals dedicated to the program on a full time basis. The requirement that the inspectors provide a Data Correlation Statement for each examination assures that results have been compared to previous examinations providing confidence that deteriorating conditions are identified. The computer data base used for tracking the program provides information during the planning stage and makes status readily apparent particularly during the final stages of outages thus assuring that all planned inspections have been completed or otherwise dispositioned.

5.0 Erosion-Corrosion Control Program

The erosion/corrosion (E/C) control program was designed by the licensee's Nuclear Plant Engineering Department (NPE) and implemented by the ISI group in the plant. To minimize the number of analyses required, NPE provided the ISI group acceptance standards based on the percent of allowable wall thinning. During the inspection if a component was found that exceeded 50% of the allowable wall thinning, the ISI group was required to request an engineering evaluation to determine the acceptability of the item. The licensee planned on inspecting a total of 98 components during this outage. Two of these components were not inspected due to ALARA and accessibility considerations.

Prior to the inspection NPE had established acceptance standards expressed as a percentage of the allowable erosion/corrosion. The

allowable wall thinning was established as the most conservative of: 1. two thirds of the nominal wall thickness originally specified; 2. the minimum wall thickness calculated in accordance with the ASME Code hoop stress formula; or, 3. the minimum wall thickness corresponding to the dynamic stress calculated from the design pressure, temperature, and weight. Thinning found to be in excess of 50% of the allowable were to be analyzed in detail by NPE. Of the 96 components inspected 18 were found to have thinning in excess of 50% of the allowable and were analyzed by NPE. In addition, to determine that the most severe case of erosion had been found, an additional 19 locations were inspected in the lines having the more severe erosion. The locations inspected were primarily in drain lines in the high pressure coolant injection system, feedwater system, main steam system, and turbine steam extraction lines.

As a result of these inspections substantial erosion-corrosion was found in 58 locations (41 of the planned and 17 of the expanded sample) minor erosion-corrosion was found in an additional 41 locations (40 of the planned and 1 in the expanded sample). As a result of the NPE evaluation seven components in four systems were replaced.

Conclusions

The E/C program initiated by the licensee appears to be adequate for tracking the erosion of various piping systems. The engineering standards set for detailed analysis were conservative and designed to prevent failures during the next operating cycle.

6.0 Primary Water Chemistry

Water chemistry data were reviewed as part of this inspection. The methods of collecting and verifying the accuracy of these data was not included in the scope of this inspection.

The inspector reviewed the primary water chemistry data for the period of January 1988 through February 1989 and discussed these data with responsible individuals in the licensee's chemistry department. Sample points for monitoring the reactor water quality are as follows:

-- Condenser hot well, monitored in the control room

-- Condensate pump discharge, monitored in the control room

-- Condensate demineralizer inlet

-- Feedwater heater inlet

-- Feedwater inlet to the reactor pressure vessel

-- Inlet to the reactor water cleanup system, monitored in the control room

-- Discharge from the reactor water cleanup system, monitored in the control room

The average conductivity per month of the primary water during the period reviewed averaged from.0.16 to 0.20 umho/cm which was within the licensee's goal of 0.20 umho/cm and below the Technical Specification requirement of less than or equal to 1.0 umho/cm; pH results ranged from 6.3 to 6.8, these similarly were within the Technical Specification range of 5.6 - 8.6. Chlorides were reported in January and February 1989 as 15 parts per billion (ppb) vs the Technical Specification limit of 200 ppb.

The main source of contamination in the primary system was from iron caused by corrosion/erosion of the carbon steel piping in the plant systems. The licensee's present filtering method lacks the capacity to remove or reduce this contamination further without overloading the radwaste system.

Conclusions

The licensee is operating the present plant equipment to obtain the optimum results for primary water chemistry. Unless major changes are made in the plant systems, such as, replacing the carbon steel piping to reduce the iron contamination no major improvements in primary water chemistry are expected.

7.0 Licensee's Actions on Previously Identified Items

(Closed) Unresolved Item (50-387/85-10-02): Radiographic film density exceeds the Code maximum allowable (weld VRR-B31-2-FW-B10) and incomplete coverage due to misplacement of the penetrameters (weld VRR-B31-2-FW-B13).

The inspector determined that weld VRR-B31-2-FW-B13 was re-radiographed with the penetrameters in the correct locations.

The inspector reviewed the available inspection documentation for weld VRR-B31-2-FW-B10 and determined that complete coverage of the weld could be established without reference to station marker 3. The inspector also determined that the existing radiographic quality was as good as was obtainable considering the adverse conditions under which the radiographs were made.

This item is closed.

With regard to the next examination of weld VRR-B31-2-FW-B13, the licensee was granted a relief request that would allow volumetric examination by either ultrasonic examination, radiography, or a combination of both methods. As of the date of this NRC inspection, the licensee had not committed to the method to be used.

(Closed) Violation (50-387/86-05-02): Failure to respond to an audit finding concerning visual inspection during snubber inspection.

The inspector reviewed the governing procedure NDI-QA-15.3.7, Revision 4, and determined that the licensee had responded to the audit finding by strengthening the snubber testing program. The inspector reviewed the snubber testing program and selected data sheets and determined that the following steps were being implemented:

-- A contractor performed the functional testing of snubbers in accordance with the Technical Specification requirements. The ISI group performed surveillance activities during this testing.

-- The ISI group (or the contractor with approval by the ISI group) prepared the necessary WA's or ERF's.

-- The ISI group reviewed and approved the functional data.

-- The ISI group submited the data sheets to the Authorized Nuclear Inservice Inspector for review.

This violation is closed.

8.0 Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items or violations. Unresolved items are discussed above.

9.0 Management Meetings

Licensee management was informed of the scope and purpose of the inspection at the entrance interview at the beginning of the inspection. The findings of the inspection were discussed with licensee representatives during the course of the inspection and presented to licensee management at the May 26, 1989 exit interview (see paragraph 1.0 for attendees).

At no time during the inspection was written material provided to the licensee by the inspector. The licensee did not indicate that proprietary information was involved within the scope of this inspection.