

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-272/87-29

Docket No. 50-272

License No. DPR-70

Licensee: Public Service Electric and Gas Company
80 Park Park Plaza - 17C
Newark, New Jersey 07101

Facility Name: Salem Generating Station, Unit 1

Inspection At: Hancocks Bridge, New Jersey

Inspection Dates: October 26 - 30, 1987

Inspector:

R. W. Winters

R. W. Winters, Reactor Engineer, MPS, EB,
DRS, Region I

12/16/87
date

Approved by:

J. Strosnider

J. Strosnider, Chief, Materials & Processes
Section, Engineering Branch, DRS, RI

12/14/87
date

Inspection Summary: Routine unannounced inspection on October 26 - 30, 1987
(Report No. 50-272/87-29)

Areas Inspected: Steam Generator Inservice Inspection and Open Items

Results: No violations or deviations were identified.

DETAILS

1.0 Persons Contacted

Public Service Electric and Gas Company

K. Bar, System Analysis Group
R. Brandt, Inspection Services Engineer
J. Clancy, Principal Engineer, Radiation Protection
R. Dolan, Chemistry Engineer
L. Fry, Station Planning Manager
R. Graybill, Manager Procurement
W. Schultz, Manager, QA Programs and Audits
G. Slaby, Senior Nuclear Performance Supervisor
R. Smith, Senior Staff Engineer, System Analysis Group
W. Treston, Senior Engineer, Site Maintenance and ISI
D. Vito, Senior Engineer Licensing
*J. Zupko, General Manager, Salem Operations

United States Nuclear Regulatory Commission

*A. Finkel, Senior Reactor Engineer
*K. Gibson, Resident Inspector
*T. Kenny, Senior Resident Inspector
*J. Prell, Reactor Engineer
*D. Silk, Operations Engineer

* Denotes those attending the exit meeting.

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

2.0 Licensee's Actions on Previous NRC Concerns

(Closed) Deviation (50-272/86-25-01 and 50-311/68-25-01) Inadequate quality controls for the designation, purchase, receipt inspection, verification, and documentation of lubricants Neolube and Fel-Pro N5000.

The inspector determined that the lubricants Neolube and Fel-Pro N5000 had been added to the list of materials requiring certification. Purchase orders, receiving inspection reports and certifications for these materials were reviewed and found satisfactory. The stock of these lubricants in the maintenance storeroom was observed to have the appropriate Quality Control release tags.

This deviation is closed.

(Closed) Deviation (50-272/86-25-02 and 50-311/86-25-02) Failure to address action item 4 of Bulletin 82-02. Failure to submit a written report following an outage when threaded fasteners were cleaned and inspected before reuse.

The required report was sent to the NRC Region I office November 21, 1986 by licensee letter NLR-N86175. The inspector reviewed the report and determined it was satisfactory.

This deviation is closed.

3.0 References/Requirements

Steam generator surveillance activities were inspected to determine compliance with the following documents:

1. Technical Specification - Steam Generators - paragraph 3/4.4.5
2. Updated Final Safety Analysis Report - Steam Generators - paragraph 5.5.2

4.0 Activities Reviewed

The inspector reviewed the eddy current test (ECT) data collected through the time of the inspection during the outage in progress, the water chemistry results from the time of plant startup, and the radiation records for the work done on steam generators during the outage in progress.

4.1 Steam Generator Eddy Current Inspection

Details of the Review

No eddy current testing was in process during this inspection. However, the inspector reviewed the preliminary results with the licensee personnel and discussed the program that was being followed. In addition to the inspections required by the technical specifications the licensee had performed a special inspection to determine the location of the antivibration bars in the U-bend section of the steam generator. Location of the antivibration bars is necessary as input to the licensee's evaluation of the steam generator tube susceptibility to the fatigue cracking mode of tube failure that occurred at North Anna.

Findings

Preliminary ECT inspection results were available for review. These data were generated by the computer printout made during the testing and had not been reviewed for adequacy or accuracy. Based on these data the licensee had identified two tubes as defective, analyzed these results and plugged them. A third tube that had been previously plugged with a explosively expanded plug was identified as have a leaking plug. A procedure for welding repair of this leaking plug was being developed. A total of 1152 tubes were inspected full length (tubesheet to tubesheet). 408

tubes were inspected to the top of the tubesheet. In addition all tubes in rows 8 through 12 were inspected to verify the location of the antivibration bars. The preliminary data indicated that 931 tubes exhibited some degree of denting at the top sides of the support plate on the hot leg side and one tube dented at both the hot and cold top support plate.

Conclusions

Eddy current testing adequately met the requirements of the technical specifications. In addition the licensee performed an inspection to locate the antivibration bars in steam generator number 13.

No deviations or violations were observed.

4.2 Water Chemistry

Details of the Review

The inspector reviewed the water chemistry history for the past ten years that had been developed in response to an NRC letter requesting information as a result of the Surry pipe erosion/corrosion incident in December 1986. Also reviewed were weekly plots of iron and copper. It should be noted that oxygen, pH, and hydrazine are recorded continuously while the plant is in operation. In addition the plant chemist maintains plots of water chemistry with notations of power transients. These plots indicate that any power transient will effect water chemistry. However, the data was not conclusive because of the few transients experienced.

Findings

The inspector reviewed past water chemistry data and concluded that the licensee has been following the Electric Power Research Institute (EPRI) guidelines as a minimum and has maintained excellent control during the lifetime of the plant. This is reflected in the very small number of tubes plugged (16) in the number 13 steam generator. Table I shows the maximum and minimum values for tests made of the water in the secondary water system. From these data and a review of the weekly report of iron and copper results it was determined that the times when water chemistry was out of the tolerances provided by the steam generator manufacturer was during transients caused by power changes. The data furnished did not show any anomalies for chlorides indicating that there were no condenser tube failures during the past year where the brackish water from the Delaware River gained entry into the secondary system.

Conclusions

Except for periods of transient operations the inspector did not observe any periods where the water chemistry was in violation of the steam generator manufacturers recommendations.

No deviations or violations were observed.

4.3 Radiation Exposure

Details of the Review

Radiation exposures are tracked by work order number and activity within the work order. For the number 13 steam generator the work order had 17 activities to be performed. Each of these activities had estimated man-rem and actual man-rem information entered daily. The actual work orders were reviewed by the inspector as well as a the summary of exposures incurred through October 26, 1987. This method of tracking allows the licensee to closely estimate exposures and with the daily entries quickly observe deviations from the estimates and take prompt corrective action if required to reduce exposures.

Findings

Radiation exposure is closely tracked, planning and scheduling is done to try to avoid the need to install dams in the main water lines from the reactor. During the outage installation of these dams was unavoidable and it accounted for approximately 55% of the exposure received to date. Helium leak detection operations to determine the location of the leaking plug accounted for another 9% of the exposure. Actual eddy current inspection is done remotely once the equipment is installed and results in exposure only when probes are changed or other maintenance activities are required.

Conclusions

The licensee was attempting to maintain exposures for the steam generator inspection and repair project as low as reasonably achievable through the use of remote inspection equipment, good controls of the inspection process, and close monitoring of the exposure records generated.

No deviations or violations were observed.

5.0 Management Meetings

Licensee management was informed of the scope and purpose of the inspection at the entrance interview on October 26, 1987. The findings of the inspection were discussed with licensee representatives during the course of the inspection and presented to licensee management at the October 30, 1987 exit interview (see paragraph 1 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.

TABLE I
STEAM GENERATOR MANUFACTURERS RECOMMENDATIONS

Control Parameters

1	Cation Conductivity Due to Strong Acid Anions at 25°C, uS/cm	≤ 0.15
2	Total Cation Conductivity at 25°C, uS/cm	≤ 0.3
3	Dissolved Oxygen, ppb (a)	≤ I 10

Diagnostic Parameters

1	Total Organic Carbon, ppb	< 100
2	Sodium, ppb	≪ 1

Ferrous Systems (b)

1	pH at 25°C	9.3 - 9.9
2	Specific Conductivity at 25°C, uS/cm	5.2 - 10.0
3	Ammonia, ppb	700 - 2000

Ferrous/Copper Systems (b)

1	pH at 25°C	8.8 - 9.2
2	Specific Conductivity at 25°C, uS/cm	1.8 - 4.2
3	Ammonia, ppb	150 - 500

SALEM RESULTS
SAMPLING POINT

	Steam Generator	Condensate Pump Discharge	Make Up Water	Steam	Feedwater
pH	9.2/8.5	9.4/8.7	8.5/6.0	9.5/8/8	9.4/8.7
Total Cond (umhos/cm)	2.21/0.79	5.35/2.11	5.34/0.08		5.54/1.62
Cation Cond (umhos/cm)	.192/.055	.145/.06	NR / .06		.110/.055
Dissolved Oxygen (ppb)		150/1	1000/50	5/5	15/0.5
Sodium (ppb)	4.4/0.5	8/<5	1.6/0.5	<5/<5	0.6/<0.1
Silica (ppb)	77/5		9/<5		
Iron (ppb)	670/<1		<1/<1		34/1
Copper (ppb)	260/<1		12/<1		16/<1
Sulfates (ppb)	3.3/<.2		6.8/1.5		3.6/<.1
Chlorides (ppb)	1.8/<.1	<50/<50	0.4/<0.1	<50/<50	0.2/<0.1
Ammonia (ppb)	185/78				380/150
Hydrazine (ppb)	87/<10				141/<10

Maximum/Minimum values shown