UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report Nos.: 50-338/92-08 and 50-339/92-08

Licensee: Virginia Electric and Power Company
Glen Allen, VA 23060

Docket Nos.: 50-338 and 50-339 License Nos.: NPF-4 and NPF-7

Facility Name: North Anna 1 and 2

Inspection Conducted: March 16-20, 1992

Inspector: _____ April 29, 1992
For N. Economos Date Signed

Approved by: _____ April 29, 1992
For R. J. Blake, Chief Date Signed
Materials Processes Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, unannounced inspection was conducted in the areas of Eddy Current (EC) examination of Steam Generator (S/G) tubes in Unit-2 and a review of upper tier documents and specifications associated with Unit-1 S/G replacement.

Results:

In the areas inspected, violations or deviations were not identified.

EC examination of the tubes in the three S/G(s) of unit-2 was being conducted using the same procedures and analysis guidelines used in Unit 1 during the last outage. Crack indications in unde ted tube support plate (TSP) intersections, expanded the scope of inspection to include (1) examination of certain S/G tubes with the rotating pancake coil probe (RPC), (2) A tube pull and, (3) examination with ultrasonics to evaluate/determine through wall crack depth. Because of a significant number of tubes scheduled for plugging, steam generators "A" and "C" were placed in category C-3 as required by Technical Specifications. The revised/expanded inspection scope was transmitted to VEPCO project manager at NRR for information purposes. The current, Unit-1 steam generator repair/replacement timetable calls for this activity to begin in January of 1993 or in November of 1992 at the earliest. Corporate planning for

this activity is proceeding in an orderly and timely manner. Management personnel charged with administering and overseeing this project appear to be well qualified with experience gained from the Surry S/G replacement. On March 23, 1992 VEPCO met with NRR staff and gave a presentation on this project which was well received. Region II management and the inspector attended this meeting.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*R. O. Enfinger, Assistant Station Manager (Operations and Maintenance)
M. Geitler, Project Manager, Steam Generator Replacement
L. N. Hartz, Manager, Nuclear Quality Assurance (QA)
*G. E. Kane, Station Manager
R. F. Saunders, Assistant Vice President Nuclear Operations
*J. P. Smith, Manager, QA, North Anna
J. A. Stall, Assistant Station Manager (Nuclear Safety and Licensing)
A. L. Travis, Supervisor, NDE

Other licensee employees contacted during this inspection included QA/QC inspectors, engineers, technicians.

Westinghouse Electric Corporation (W)

V. A. Ingraham, Level III Eddy Current (EC)
B. Jolley, Site Coordinator

NRC Resident Inspector

*D. Taylor, Resident Inspector

*Attended exit interview

2. Steam Generator Tube Eddy Current Inspection Unit 2, (73753)

At the time of this inspection, the Eddy Current inspection activity was in process. The inspector met with VEPCO's site Non-Destructive Examination (NDE) supervisor to discuss technical aspects of the inspection and obtain a progress report on the subject activity. Data acquisition procedures and data analysis guidelines were the same a those used in Unit 1. Westinghouse (W) was the primary contractor in charge of data acquisitions and analysis. The EC inspection plan, which had been approved by VEPCO's Steam generator advisory Committee, was as follows:

100% Bobbin Inspection of all available tubes, full length (except Row 2 U-Bends) in all three Steam Generators.

100% RPC Inspection of all available Row 2 U-Bends in all three Steam Generators

100% RPC Inspection of all available top of tubesheet areas (Wextex Area) on the hot leg only, in all three Steam Generators.

100% RPC Inspection of all available hot leg dents in Steam Generators A and B.

RPC Inspection of 20% of all available hot leg dents in Steam Generator C.

On March 16, 1992 the inspector ascertained that Bobbin coil inspection and analysis had been completed on all three S/G (s). Results of this inspection revealed that eleven (11) tubes required plugging in S/G "A", one in S/G "B" and three in S/G "C". As required by the Data Analysis Program, a number of tubes with certain type of Bobbin indications required further examination with the rotating pancake coil (RPC), probe. This examination identified for plugging, an additional 22 tubes in S/G "A" and one additional tube in S/G "B". The above 22 tubes were found to exhibit both axial and circumferential crack indications within the undented tube support plate intersections. The subject intersections were on the hot leg side of the steam generators and related to primarily the first and second support plates. Because this phenomenon had not been previously associated with the North Anna S/G(s), and, in anticipation of an expanded RPC examination, site management initiated a 100% RPC examination of all intersections up to the seventh support on the hot leg side of all three S/G (s). In addition, VEPCO provided W with related inspection data and requested that they conduct expert technical evaluation and recommendations for further examination and/or corrective actions. On March 18, 1992 the licensee met with W at North Anna and received the following recommendations:

1. Continue collection of data for expanded RPC program:

S/G "A" - Plan 100% of tubes to TSP4, if no pluggable indications found after 20% (650 tubes), continue to 100% of tubes to TSP2.

S/G "B" Same plan as "A".

S/G "C" - Continue 100% all intersections to TSP5 and remaining dented intersections TSP7 as necessary.

2. Perform as recommended UT on 10 intersections in "A" for circumferential appearing indications at undented TSP intersections and largest dented TSP intersection in "C".

3. Prepare to pull tube R11 C 43. Any additional tube pulls will only be considered after relevant UT is complete. Additional future candidates are R8 C 34 & R7 C 25.

This program was implemented on March 19, 1992 and was still in progress as of the 26th of March 1992. On this date the inspector received, by telephone, the status of this inspection

	A	B	C
Expanded Program Planned	3244	3253	3205
Inspected	1902	1527	1078
Analyzed	1902	1527	1078
Pluggable	4	3	6
Total Tubes Scheduled for Plugging	40	13	124

In reference to the inspection of tubes around the Wextex area of the tube sheet, VEPCO notified the Region and NRR on March 13, 1992 that RPC examination disclosed that tube R15-C61 in S/G "B" exhibited a circumferential indication with an arc length of about 324 degrees. On the same day vepco issued deviation report N-92-800 requesting that W review present and previous data to gain a better understanding of the existing condition and its implications on the operation of Unit 1.

The inspector reviewed the RPC data from the present and previous examination dated October 9, 1990 and verified the arc length and location of the indication, which was at the top of the tubesheet. In addition the inspector noted that the graphics exhibited distinct similarities in terms of configuration, and orientation of the indication. The inspector also noted that the 1990 data showed the indication had an arc length of approximately 300 degrees with significant peaks which should have designated the tube a candidate for further review or flagged for plugging. On the contrary, this defect was analyzed and characterized according to the Analysis Rules for North Anna as NDD which means that there was no evidence of degradation-which clearly was not the case. On the contrary, the aforementioned analysis rules state that when RPC graphics depict a circumferentially oriented indication where the axial extent is less than the circumferential extent then it is to be identified as a multiple or single circumferential indication (MCI or SCI). This same indication was revisited during the current EC examination and following analysis, it was again characterized as NDD - which as stated earlier, is not the case. The inspector's concern and VEPCO's site managements concern, is that the present Analysis Rules being used on Unit 2 were applicable to unit 1 examination and therefore it is entirely possible that tubes with similar indications whose through wall depth (TWD) has not been assessed and quantified were returned to service. Vecpo's on site management has raised similar questions and concerns to W, who must respond before the aforementioned Deviation Report (N-92-800) can be closed. The inspector opened an unresolved item pending review of the corrective action/response by W on this matter. Unresolved Item 339/92-08-01 Multiple Circumferential Indications Tube R15-C61 S/G "B".

Within the areas inspected violations or deviations were not identified.

3. Steam Generator Replacement (Unit-1) 37700

On a previous inspection, documented in Region II Report 338,339/92-02, the inspector met with project management to obtain a broad overview on certain phases of this project including procurement, organizational structure and projected installation activities.

During the present inspection, the inspector visited VEPCO's Technical Center in Glen Allen, VA to meet with project management and review certain upper tier documents including the following:

- VPAP-0107 Rev 0: Steam Generator Replacement Project
- NAP-001 Rev. 4: Specification for S/G(s) North Anna Power Station Unit -1.
- Design Change 90-13-1: Steam Generator Repair, North Anna Unit -1
- Steam Generator Quality Plan

  S/GQP2.3 - Document Control

  S/GQP2.2 - QA Personnel Qualification Requirements

  S/GQP2.1 - Organization

  S/GQP3.4 - Surveillance/Inspections

  S/GQP5.2 - Stop Work

  S/GQP5.1 - Corrective Action Requests

  S/GQP4.1 - Nonconformance Reporting

- Vendor Inspection Reports
  SAN - MWG - 018 through - 024
  SAN - H.O - 008
  WPP - J.O - 017 and 018

- Nonconformance Report(s)
  Anticipation bars, dated 8/19/91

By review of the aforementioned documents and through discussions with project management the inspector ascertained that the Bechtel Corp. (Bechtel) who had been awarded the phase 1 engineering and licensing contracts was also awarded the construction/replacement contract. Stone and Webster being the Architect Engineering organization, of this plant will handle stress analysis on impacted piping systems. Also the inspector ascertained that the replacement S/G(s), which are identified as model(s) 51F, will feature certain material and/or design enhancements including forged steel channel head, seamless forged shell barrels, seamless forged transition cone with cylindrical end stand, thermally treated alloy 690 tubing, and stainless steel tube support plates with broached quatrafoil tube holes. The number of tubes per steam generator will be increased from the present 3388 to 3592 which will result in a corresponding increase to the total heat transfer surface area. The use of seamless forging material will minimized the number of welds in each steam generator and thereby reduce inservice inspection requirements which

will effectively reduce dosage. Plant changes will include the S/G lower Assembly Steam Flow Limiter, Pipe Whip Restraint removal (no longer required) and, new Thermal Insulation. Applicable Codes and standards for fabrication and testing include ASME Code Section III Division 1 1986; Section IX Edition 1986 with all Addenda through winter 1988, Section XI Edition 1983 with all Addenda through Summer 1983. Regulatory Guides 1.29, 1.31, 1.37 and 1.38, are applicable

In reference to licensing questions, VEPCO determined that there were no unreviewed safety questions and no changes to Technical Specifications, therefore the S/G replacement will be performed under 10 CFR 50.59 previsions.

Quality Assurance (QA) considerations have been addressed in the aforementioned documents. As such, project QA will be under the corporate QA manager with technical interfacing with Station QA as required. The project QA team will consist of a coordinator with personnel totally dedicated to the project. Day to day project construction activities will be under Bechtels QA program which will be audited and approved by VEPCO prior to its implementation on the project. VEPCO will conduct surveillance of act vities i.e. installation welding and NDE. Third party inspections will be performed. Project consideration for reducing personnel dosage will include the use of optical templating allowing extensive prefabrication outside the radiation areas, remote welding and milling equipment, remote video coverage, full channel head, nozzle and loops piping mock-ups, extensive decontamination and low dose rate waiting and staging areas. The licensee has arrange to remove the RTD bypass system during this timeframe. At the time of this inspection the Project Manual which will describe engineering support and other project interfaces during construction was being developed.

Within the areas inspected violations or deviations were not identified.

4. Safety Injection Accumulator Nozzle Repair (Unit 2)

In response to Information Notice 91-05, the licensee performed ultrasonic examination on the nozzle of the three accumulators to check for intergranular stress corrosion cracking around the heat affected zone (HAZ) areas. Results of this examination revealed that one of the nozzles (2-SI-156) of "B" Accumulator exhibited evidence of cracking at the HAZ near the six o'clock position of the nozzle. Following confirmation by radiography, the licensee began preparations to repair the nozzle. The inspector reviewed the UT documentation and confirmatory radiographs to verify the licensee's findings. Because the pending repair was still in the planning stages, no further inspection could be performed. However, the inspector generated an inspector followup open item 339/92-08-02 Accumulator "B" Nozzle Repair and Testing, to allow for a detail review of the work package on a future inspection.

Within the areas of inspection deviation or violations were not identified.

5. Exit Interview

The inspection scope and results were summarized on March 20, 1992, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results listed below. Proprietary information is not contained in this report. Dissenting comments were not received from licensee.

(Open) UNRI 339/92-08-01, Multiple Circumferential Indications, Tube R15-C61 S/G "B", paragraph,2.

(Open) IFI 339/92-08-02, Accumulator "B"Nozzle Repair and Testing, paragraph 4.