



UNITED STATES  
 NUCLEAR REGULATORY COMMISSION  
 REGION II  
 101 MARIETTA ST., N.W., SUITE 3100  
 ATLANTA, GEORGIA 30303

Report Nos. 50-338/82-35 and 50-339/82-35

Licensee: Virginia Electric and Power Company  
 Richmond, VA 23262

Facility Name: North Anna

Docket Nos. 50-338 and 50-339

License Nos. NPF-4 and NPF-7

Inspection at North Anna site near Mineral, VA

Inspector: *N. Economos*  
 N. Economos

*10/20/82*  
 Date Signed

Approved by: *J. J. Blake*  
 J. J. Blake, Section Chief  
 Engineering Inspection Branch  
 Division of Engineering and Technical Programs

*10/20/82*  
 Date Signed

SUMMARY

Inspection on September 27-30, 1982

Areas Inspected

This routine, unannounced inspection involved 38 inspector-hours on site in the areas of steam generator tube end repair, reactor coolant pump diffuser capscrew replacement, RCP stud nondestructive examination, guide tube support split pin replacement, flow splitter removal, and previous inspection findings.

Results

No violations or deviations were identified.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

\*W. R. Cartwright, Station Manager  
\*J. Harper, Superintendent - Maintenance  
\*A. C. Hogg, Jr., Manager QA  
\*J. A. Hanson, Jr., Superintendent - Technical Services  
\*H. L. Travis, NDE Level III  
\*J. C. Paul, NDE Supervisor  
\*R. T. Johnson, QA Engineer  
J. McVoe, Project Manager  
B. Jones, Senior QC Inspector

#### Other Organizations

F. Mahaffey, Task Manager, Lynchburg Field Technical Services (LFTS)  
L. Bahn, Senior Engineering Advisor, Equipment Design, LFTS

#### NRC Resident Inspector

\*M. Shymlock

\*Attended exit interview

### 2. Exit Interview

The inspection scope and findings were summarized on September 30, 1982, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed areas of concern described in the body of this report. No dissenting comments were submitted by the licensee. The following new item was identified: Inspector Follow-up Item (50-336/82-35-01) RCP Capscrew Replacement Resistance to Stress Corrosion Attack.

### 3. Licensee Action on Previous Enforcement Matters

Not inspected.

### 4. Unresolved Items

Unresolved items were not identified during this inspection.

### 5. Independent Inspection Effort (92706)

Performed walk-through inspections inside Unit 1 containment to observe the status of reactor coolant pump diffuser capscrew replacement, steam generator tube end repair, reactor coolant stud (bolt) inspection, thermal

sleeve and RC loop isolation valve guide retrieval, thermal sleeve removal and in general tool control and cleanliness in and around work areas. Within these areas no deviations or violations were identified.

6. Reactor Coolant Pump "B" Main Flange Bolt Nondestructive Examination (73753)

Observed magnetic particle inspection of two RC pump "B" main flange bolts. The examination was performed in accordance with VEPCO procedure NDE-MT-1, Revision 0 which referenced ASME Section XI (74S75). Records reviewed included personnel, material and equipment certification.

Within the areas inspected, no deviations or violation were identified.

7. Inspector Followup Items (92701)

- a. (Closed) Item 338/82-19-03, Steam Generator Tube End Repairs, Unit 1. Repair work on steam generator "C" was in progress at the time of this inspection. The work was being performed by Babcock and Wilcox, Field Technical Services under mechanical maintenance procedure MMP-C-RC-2.1 and maintenance request (MR) N1-82-09221150. Applicable requirements, included by reference, Westinghouse (W) Technical Manual 1440-C234 and Sections 5.5.2 and 16.3.1 of the N.A.F.S.A.R. The inspector discussed details of the procedure with cognizant B&W personnel and observed the operation on TV used for monitoring purposes. Essentially, the repair is a two-step operation; first the tube is deburred with a modified I.D. deburring tool to clean and reopen the end of the tube. The second step involves the use of an end mill to remove the deformed material off the tube end to provide a flat clean surface. This operation will ensure a nominal ID of at least 0.715."

At the time of this inspection, approximately 1300 tubes had been repaired. The repair in SG "C" began on or about September 22; nothing had been done in SG "A." The repair on both SGs "A" and "C" is expected to take approximately 26 days to complete. No deviations or violations were noted.

- b. (Closed) Item 338/82-19-02, Specification of Penetrant Materials. The inspector reviewed the licensee's resolution documented on form ADM-48.0, Attachment 1, Serial #02-82-4260(002), and results of an equivalency test submitted by the contractor, the Virginia Corporation. The document stated in part that in order to resolve any questions that may arise from the use of the Sherwin penetrant system, to perform penetrant tests in accordance with Westinghouse ISI procedure ISI-11, Revision 9, Amendment 3; three aluminum operator blocks, prepared in accordance with Article 6, Section V ASME Boiler and Pressure Vessel Code, were tested with Sherwin and Magnaflux penetrants. The results showed that the two penetrant systems were equivalent in detecting the cracks in the comparator blocks. Photos were made of the tests and these will be retained on file by the Virginia Corporation along with this letter. The Authorized Inspector witnessed the exams and concurred that the two systems were equivalent.

- c. (Open) Item 338/82-19-01, RC Pump Flow Splitter Indications. At the time of this inspection, the licensee had completed cutting and removing the flow splitter plates from the three loops. The cuts were made approximately 3/4 to 1 1/4 inches away from the ID surface, thus leaving a boss in this area. Machining of the cut surface in loop "A" was complete. There were no plans to do any machining in loops "B" and "C". UT has been performed on both the wall and reactor vessel sides of the three loops. Visual inspection, with the aid of a video camera, was performed on loops "A" and "B" and on the wall side of loop "C."

A review of records and related reports disclosed the following:

- Loop A - A number of linear and rounded discontinuities were observed on the face and/or edge of the boss following machining. Subsequent exploratory machining/milling showed them to be, for the most part, rounded and were interpreted as probable casting shrinkage, porosity or the results of weld repair(s) on the casting. The discontinuities did not appear to be interconnected to other subsurface defects detected by UT and were completely removed when machining progressed to a depth of about 0.161 inches below the cut surface of the boss. An evaluation performed by (W) concluded that none of the loading frequencies match with the natural frequency of the remaining boss and therefore, the discontinuities are not expected to propagate into the wall thickness. However, in the event that propagation should occur, the report stated that the fatigue crack growth rate would be such that it would not impair the pressure boundary.
- Loops "B" - Subsurface indications detected by earlier and recent  
and "C" UT examinations have been analyzed by (W) and the conclusions, which were the same as those stated above, were documented by memorandum VRA-82-544 dated September 10, 1982.

Moreover, (W) letter VPU(RRK)-393 dated July 29, 1982, which appears as Attachment A to Design Change 82-S15 Revision 3, recommends that:

- (1) Perform a UT examination shortly after the splitter is removed to provide a baseline for future inspections
- (2) Perform augmented inservice inspections (UT) during each of the next two plant shutdowns
- (3) If no changes are detected, then one more inspection should be considered at the fourth shutdown

Within these areas the inspector noted that the analysis addressed the probability of pressure boundary degradation from indications remaining in the boss after the flow splitter plates were removed. As stated above, factors considered in the (W) analysis included:

- (1) A comparison between loading frequencies and the natural frequencies
- (2) A natural mode analysis of the boss
- (3) Calculation of the stress intensity factor and critical crack size - assuming a notch (max. 1/16 inch) could be caused by the plasma cutting process.
- (4) The possibility of crack propagation into the elbow wall.

In discussing the methodology of the analyses and results with the licensee, the inspector pointed out that the presence of surface discontinuities/flaws, related to casting and/or weld type defects e.g., shrinkage, porosity, lack of fusion and slag in Loop A makes these areas highly susceptible to corrosive attack which had not been addressed in the analysis. The inspector stated that the susceptibility of these areas/crevices to corrosive attack was intensified by the fact that no attempt had been made to grind them out. Hence, in their present state, they have to be considered as excellent sites for trapping impurities and promoting corrosion.

The licensee representative concurred with the inspector's concern and agreed to pursue this issue and provide an appropriate response. Also, the licensee has agreed to perform the (W) recommended augmented inservice inspection, discussed earlier, and to address this issue in the form of a submittal to NRR, who has the technical lead on the flow splitters.

Within the areas inspected, no deviations or violations were noted.

8. Reactor Coolant Pump Diffuser Adaptor Capscrew Replacement (92705)

Replacement of reactor coolant pump (RCP) "B" diffuser adaptor capscrew was completed at the time of this inspection. The replacement screws were produced from material identified as SA-453 Grade 660 Conditions A and B. The document used to control the replacement activity was identified as mechanical maintenance procedure MMP-C-RC-1, dated May 17, 1982, and maintenance request NI-82-08161309, Revision 4. The capscrews were released to the site on (W) quality release (QR) E 58710, Revision 0. The inspector reviewed the aforementioned procedures, quality releases, QC inspection records for completion, clarity, accuracy, and resolution of installation deviations. Also, the inspector observed the removal and replacement of

selected capscrews on RCP "B" during the second shift on September 28, 1982. Within these areas the inspector noted that the justification for using the replacement material was based on the premise that it was stronger and therefore would provide a greater margin of safety against failure. However, the inspector expressed reservations to this rationale on the basis that the apparent failure mechanism was identified unofficially by two investigating laboratories as stress corrosion rather than a fatigue related failure. Moreover, the inspector stated that it would be prudent to run corrosion tests on these bolts in the as-received condition to determine their resistance to stress corrosion cracking in a PWR environment rather than rely solely on their strength. The licensee agreed to pursue this matter further with (W). This item has been identified as inspector followup item pending a review of the licensee's response to the aforementioned concerns, 338/82-35-01, RCP capscrew replacement resistance to stress corrosion attack.

9. Guide Tube Support Split Pin Replacement (92705)

Inspection of this activity was a followup to a previous work effort documented in RII report number 50-338/82-28. The inspector discussed this matter with the licensee's cognizant engineer, observed the internals which are currently stored insitu, and reviewed the following controlling documents:

Design Change 82-S17	7/22/82
Split Pin Removal Tool	MP 2.7.1 VRA-3
Engineering Review	7/26/82
Safety Analysis	7/26/82
Final Design	7/26/82
17 X 17 Guide Tube Removal	MP 2.7.1 VRA-1
17 X 17 Guide Tube Installation	MP 2.7.1 VRA-2
(W) Documents Marked Proprietary	

Other records reviewed included nonconformance reports, process control records, liquid penetrant inspection reports, on lower guide tube lifting fixtures (Proc. QCI-PT-1 ANSI 31.7), VEPCO QC inspection reports on upper internals package to assure split pin remnants were accounted for, IR-N-82-900, and receipt inspection of upper and lower guide assemblies. Work on this activity completed on September 10, 1982.

Within the areas inspected, no deviations or violations were identified.