



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

Report Nos.: 50-280/91-15 and 50-281/91-15

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

Docket Nos.: 50-280 and 50-281

License Nos.: DPR-32 and DPR-37

Facility Name: Surry 1 and 2

Inspection Conducted: May 20, 22, and June 19, 1991

Inspector:

*[Signature]*  
M. L. Coley

*7/8/91*

Date Signed

Accompanying Personnel: J. J. Blake, June 19, 1991

Approved by:

*[Signature]*  
J. J. Blake, Chief  
Materials and Processes Section  
Engineering Branch  
Division of Reactor Safety

*7/8/91*

Date Signed

SUMMARY

Scope:

This routine unannounced inspection was conducted in the areas of inservice inspection (ISI) including observation of visual and nondestructive examinations on main steam system piping welds; verification of licensee implementation of NRC Generic Letter 88-05, which required PWR licensees to establish a boric acid prevention program, verification of licensee implementation of NRC Generic Letter 90-05, which provides guidance to licensees for performing non-code repairs of ASME Code Class 1, 2, and 3 piping, and review of Erosion/Corrosion Inspection and Analysis Program.

Results:

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

This inspection indicated that ISI/nondestructive examinations were conducted adequately. The licensee's assistance was very helpful in assuring that necessary personnel, procedures, and documents were available in a timely manner. The inspector identified two inspector followup items. The first involved a questionable visual inspection on a piping modification, paragraph

2.a. The second involved the 10% acceptance criteria for boric acid corrosion included in Engineering Procedure 84, paragraph 3. At the close of the inspection the licensee was actively investigating the specifics of both items to determine the possible deleterious affects on reactor plant components and to strengthen any programmatic deficiencies identified.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- \*R. Bilyeu, Licensing Engineer
- \*H. Collar, Quality Assurance (QA) Supervisor
- B. Foster, Supervisor, Mechanical Engineering
- D. Grady, Nondestructive Examination (NDE) Supervisor
- \*T. Huber, Inservice Inspection (ISI) Supervisor
- B. Johnson, Mechanical Design Engineering
- \*M. Kansler, Station Manager
- D. Phelps, Mechanical Design Engineering
- \*J. Price, Assistant Station Manager
- \*D. Rogers, Lead ISI Engineer
- \*T. Sowers, Superintendent of Engineering

Other licensee employees contacted during this inspection included craftsmen, engineers, technicians, and administrative personnel.

#### NRC Resident Inspector

- \*J. York, Resident Inspector

#### \*Attended exit interview

### 2. Observation of Visual, Liquid Penetrant, and Magnetic Particle Examinations - Unit 2

The inspector observed the visual, liquid penetrant, and magnetic particle examinations for four main steam system piping welds that had been fabricated in accordance with Work Order (W.O.) 3800095205 and the American National Standards Institute (ANSI) B31.1 Code (1967 Revision). The four welds are also considered by NRC Reg. Guide 1.26 and the 1980 Edition of Section XI, of the ASME Code, to be ASME Code Class 2 welds that require both preservice and inservice inspections. Examinations for the following welds were observed:

<u>Weld ID</u>	<u>Methods of Examination</u>
2-MS-119-18A	Visual and Liquid Penetrant
2-MS-119-16A	Visual and Magnetic Particle
2-MS-119-17A	Visual and Liquid Penetrant
2-MS-119-19A	Visual and Liquid Penetrant

a. Visual Examination (57050)

The inspector observed a visual examiner conduct the final visual examinations for the piping modification welds listed above. The initial results of the examiner's inspections were that two welds (2-MS-119-16A and 2-MS-119-17A) were unacceptable due to surface roughness and that the other two welds (2-MS-119-18A and 2-MS-119-17A) were acceptable. The inspector however, had failed to observe the examiner use any measuring device on either of the welds prior to his annotating the records that the final visual inspection for both of these welds were acceptable. In addition, the examiner had not brought a copy of the General Welding Procedure (P-101) to the job in order to determine the proper weld size in accordance with the correct welding specification and the appropriate material thickness. After being questioned by the inspector concerning the examination, the visual examiner obtained a copy of the General Welding Procedure and weld gages and proceeded to perform satisfactory examinations of the welds in question. All four welds were subsequently found to be acceptable. Further discussions with the visual examiner indicated that he was convinced that he had performed weld size measurements with a welder's six inch scale. However, the inspector did not observe the examiner using the six inch scale until after he had indicated that the two welds were acceptable.

The inspector held preliminary discussions with the examiner's supervisor concerning the above issue on May 22, 1991. However, due to illness the inspector was unable to pursue this matter further until June 19, 1991. Discussions with the Supervisor of Quality Assurance on June 19th revealed the following:

- The visual examiner qualification records indicated that he had significant experience as a visual examiner.
- The quality assurance supervisor issued a memo to all inspection personnel on May 24, 1991, reminding them that they are responsible for determining procedural requirements, the inspection tools needed, and the proper acceptance criteria to be used prior to going to the job site.
- Virginia Power is presently in the process of performing an audit of all vendor inspection personnel at the Surry and North Anna facilities to determine the effectiveness of their vendor examiners and to improve programmatic control of vendor activities.

The inspector considers the actions taken by the licensee to date and those presently in-process to be responsible actions on the part Virginia Power and appropriate for the concern raised by the inspector. Therefore, pending review of the licensee's audit findings and additional surveillance of inspection activities by the inspector this item will be tracked with Inspector Followup Item No. 50-281/91-15-02, "Visual Inspection of Piping Modification."

b. Liquid Penetrant Examination (57060)

The inspector observed a nondestructive examination (NDE) examiner perform liquid penetrant examinations on welds no. 2-MS-119-18A, 17A, and 19A. The examinations were conducted in accordance with approved procedure no. NDE-PT101, Rev.0. Discontinuities revealed during the examination were properly interpreted, evaluated, removed as necessary, and reexamined. The examiner's technical skills, knowledge of procedural requirements, and adherence to these requirements were commendable.

c. Magnetic Particle Examination (57070)

The inspector also observed the NDE examiner perform a magnetic particle examination of weld no. 2-MS-119-16A. The examination was conducted in accordance with the approved procedure (NDE-MT-101 Rev.1). No discontinuities were observed during the examination of this weld. The examiner was proficient in the inspection method.

Within the areas examined, no violation or deviation was identified.

3. Verification of Licensee Implementation of NRC Generic Letter 88-05 (92701)

NRC Generic Letter 88-05, Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants, requested licensees to provide assurances that a program has been implemented at their facilities to ensure that boric acid corrosion due to leakage will not lead to degradation of the reactor coolant pressure boundary. This program is to include the following items:

- Determination of the principal locations where leaks may occur and cause significant boric acid corrosion of the primary pressure boundary.
- Procedures for locating small coolant leaks (i.e., leakage rates at less than technical specification limits).
- Methods for conducting examinations and performing engineering evaluations to establish the impact on the RCS pressure boundary when leakage is located.
- Corrective action to prevent recurrences of this type of corrosion.

On June 3, 1988, the licensee forwarded their letter of response to NRC. This response basically stated that, the Surry Power Station has procedural controls in place to accomplish each of the above NRC program concerns. On May 22, 1991, the inspector audited the licensee's program to verify the adequacy of the boric acid prevention program in place. The inspector found the licensee's program to be adequate with one possible exception. This exception was found in Surry's Engineering Procedure No. ENG-84, dated December 10, 1987, and entitled, "Evaluation of Safety



Related Components with Excessive Boric Acid." Paragraph 5.8 of this procedure sets a Go/No-Go acceptance criteria of 10% for depth of corrosion on all reactor plant components. Although, 10% sounds reasonable for standard components, there are some reactor coolant components such as the reactor main coolant pumps (MCP) bolts and the reactor vessel studs that are manufactured to critical drawing tolerances. A recent experience with boric acid corrosion on MCP bolts at another utility revealed that the suggested bolt acceptance criteria, after material lost due to corrosion, was much more stringent than the 10% delineated in Engineering Procedure 84. The acceptance criteria on these components are also low because even minor leakage on these components can cause corrosion rates of .400 inch per month and therefore serious damage can occur on these bolts between outages. The inspector held discussions with cognizant licensee personnel concerning notifying the equipment vendor and acquiring a list of components where the 10% acceptance criteria would be inadequate. In addition, the licensee should seek guidance from the vendor in establishing an appropriate acceptance criteria. The licensee's actions regarding resolution of this issue will be tracked by Inspector Followup Item 50-280,281/91-15-01, "Acceptance Criteria for Boric Acid Corrosion on Reactor Coolant Boundary Components."

Within the area examined, no violation or deviation was identified.

4. Review of Licensee's implementation of NRC Generic Letter 90-05, "Guidance for performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 piping" (92701)

The inspector held discussions with the Lead ISI Engineer to determine if the guidance for performing temporary non-code repairs of ASME Code piping had been implemented in procedures at Surry. Procedural implementation of the Generic Letter Guidance is important in that it ensures programmatic criteria exist for these important repair activities. The discussions revealed that Virginia Power is presently revising Procedure No. VPAP-037, which is utilized for the repair and replacement of ASME Section XI components, to implement Generic Letter 90-05. The effective date for issuance of the revised procedure is August 1, 1991.

Within the area examined, no violation or deviation was identified.

5. Review of Erosion/Corrosion Inspection and Analysis Program (92701)

On June 19, 1991, the inspector reviewed the licensee's programs for erosion/corrosion inspection and analysis. The review was conducted by interviewing the responsible personnel in the site Mechanical Design Engineering Group. The purpose of the review was to determine the scope of the site program for inspecting, testing, analyzing, and predicting erosion and erosion/corrosion problems at Surry. The personnel interviewed were able to describe and trace the history of the inspection and analysis program at Surry and demonstrate the analysis procedures that are currently being used.

The site uses programs that were developed in conjunction with EPRI. These programs are CHEC-NDE which is the inspection program, and CHEC and CHECMATE which are the modeling programs for single phase flow and two-phase plus chemistry. The site people further explained that they receive guidance and direction for the site inspection and analysis programs from a corporate engineering group located at the Innsbrook Technical Center.

This review showed that Virginia Power Co. has a very comprehensive program for the inspection and analysis of erosion/corrosion of the piping at the Surry station. This program should provide sufficient warning to preclude another catastrophic failure at Surry. The scope of work that is ongoing at Surry includes the replacement of carbon steel piping components with chrome-moly alloy steel whenever the inspections indicate that there is significant, flow-related, wall reductions.

There were no violations or deviations identified during this part of the inspection.

6. Exit Interview

The inspection scope and results were summarized on June 19, 1991, 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 the licensee.

(Open) Inspector Followup Item 50-280,281/91-15-01, "Acceptance Criteria for Boric Acid Corrosion on Reactor Boundary Components," paragraph 3

(Open) Inspector Followup Item 50-281/91-15-02, "Visual Inspection of Piping Modification," paragraph 2.a