

VIRGINIA ELECTRIC AND POWER COMPANY  
RICHMOND, VIRGINIA 23261

December 15, 2011

United States Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, DC 20555-0001

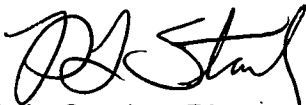
Serial No. 11-685  
SPS LIC/CGL R0  
Docket No. 50-280  
License No. DPR-32

**VIRGINIA ELECTRIC AND POWER COMPANY**  
**SURRY POWER STATION UNIT 1**  
**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION**  
**2010 STEAM GENERATOR INSERVICE INSPECTION REPORT**

By letter dated May 24, 2011 (Serial No. 11-289), Virginia Electric and Power Company (Dominion) submitted information summarizing the results of steam generator (SG) tube inspections performed at Surry Power Station Unit 1 during the Fall 2010 refueling outage. On November 30, 2011, the NRC requested additional information related to the SG inspections. The NRC's questions and Dominion's responses are provided in the attachment to this letter.

If you have any questions or require additional information, please contact Ms. Candee Lovett at (757) 365-2178.

Very truly yours,



B. L. Stanley, Director  
Station Safety and Licensing

Attachment

Commitments made in this letter: None

A047  
NRC

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**ATTACHMENT**

**Response to NRC Request for Additional Information Regarding  
2010 Steam Generator Inservice Inspection Report**

**Surry Power Station Unit 1**

**Virginia Electric and Power Company  
(Dominion)**

By letter dated May 24, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession Number ML11154A101), Virginia Electric and Power Company (Dominion) submitted steam generator (SG) tube inspection results from the 2010 inspections at Surry Unit 1. On November 30, 2011, the NRC requested additional information related to the SG inspections. The NRC questions and Dominion's response are provided below.

#### **NRC Question 1**

*You state in your letter that the fall 2010 outage was the last outage in the 3<sup>rd</sup>, 60 effective full power month inspection period. Please clarify whether you met your technical specification requirement to inspect 100 percent of the tubes by the end of the inspection period (or a prorated sample percentage as discussed in Regulatory Information Summary 2009-04, "Steam Generator Tube Inspection Requirements," (ADAMS Accession Number ML083470557) with techniques capable of finding the forms of degradation to which the tubes are potentially susceptible.*

#### **Dominion Response**

The Surry Unit 1 SG inspections performed during the 3<sup>rd</sup> inspection period met the requirements of Technical Specification (TS) 6.4.Q.4.b. All locations or a prorated sample percentage susceptible to existing and/or potential degradation mechanisms were examined during the period, with techniques qualified to detect the degradation mechanisms.

#### **NRC Question 2**

*Please discuss the results of the foreign object search and retrieval inspections that were performed in the three SGs. Also, please clarify whether you did the foreign object search and retrieval inspection before or after the replacement of the SG feedrings.*

#### **Dominion Response**

The foreign object search and retrieval (FOSAR) examinations were performed in each SG at the top of the tubesheet, in the annulus, and in the no-tube lane after the replacement of the feedrings. Examination of localized areas of the upper surface of the flow distribution baffle (FDP) during the investigation of eddy current possible loose part (PLP)/wear indications in SG "B" and "C" revealed an accumulation of exfoliated scale. In-bundle visual examinations were performed in SG "A" to evaluate the general location of the hard collar region.

During the FOSAR, known and potential foreign object regions were investigated visually. The suspected presence of irretrievable foreign objects led to the stabilization and plugging of two tubes, both of which showed evidence of relatively minor degradation (SGB R37C22 and SGB R38C21). A summary of FOSAR investigations and findings is provided below for each steam generator.

There were four areas of interest with respect to FOSAR in SG "A":

- 1) A disk shaped object fused to the tubesheet on the cold leg was identified during EOC22 and evaluated for Cycle 23 service. The location had not changed from EOC22. No

tube wear was noted, and the object was evaluated as acceptable as-is for Cycle 24 operation.

- 2) A wire on the tubesheet in the cold leg was identified during EOC22 and evaluated for Cycle 23 service. Multiple attempts to remove the wire were not successful, and its position had not changed since EOC22. No tube wear was noted from the wire, and it was evaluated as acceptable as-is for Cycle 24 operation.
- 3) An eddy current PLP signal at the top of tubesheet on the cold leg (SGA R37 C27) was identified to be loose tube scale that broke apart during the secondary side inspection (SSI).
- 4) An eddy current PLP signal at the top of tubesheet on the hot leg (SGA R16 C35) was identified to be a fixed sludge rock which was left as-is and will continue to be monitored.

In SG "B" there were three areas of interest with respect to FOSAR:

- 1) An eddy current PLP signal at the top of tubesheet in the hot leg (SGB R3 C84) was identified to be sludge formation at the base of the tube.
- 2) A cluster of tubes with wear and eddy current PLP indications at the FDP on the hot leg were identified. Visual examinations in this region identified no foreign objects. The PLP signals were likely caused by the copious scale identified in the region. Eddy current testing (ECT) wear indications were shallow. No foreign objects remained in the region. The wear and loose parts indications will be monitored during future ECT exams.
- 3) Two adjacent tubes with wear (SGB R37 C22 and SGB R38 C21) at the second tube support plate (02H), one with an eddy current PLP indication, were identified. The PLP could not be visually confirmed due to the location at the upper side of the 2<sup>nd</sup> tube support plate (TSP). The affected tubes were stabilized and plugged.

In SG "C" there were two areas of interest with respect to FOSAR:

- 1) An eddy current wear indication at the baffle plate hot (BPH) (SGC R27 C82) was identified. SSI confirmed that no foreign object existed in the location. This location will be monitored during future ECT exams.
- 2) Two adjacent tubes with eddy current PLP indications at the top of tubesheet on the hot leg (SGC R10 C70 and SGC R11 C69) were identified. The PLP indications were found to be heavy scale which was removed from the tube location; as the grippers pulled out of the tube bundle into the no-tube lane, the heavy scale broke free, broke apart, and could not be recovered.

### **NRC Question 3**

*Previous dents whose voltages exceeded two volts were inspected with a rotating probe. Please discuss what percentage of the dent population was inspected. Please discuss whether any new dents were identified during the 2010 inspections. If new dents were detected, please discuss whether they were inspected with a rotating probe. If not inspected with a rotating probe, discuss the basis for not performing such inspections.*

### **Dominion Response**

During EOC23, 57% of hot leg dents in SG "B" were examined with rotating probes (i.e., 92 examinations / 161 dents). Note that this sample and population includes 32 hot leg dents that were reported during EOC21 that were not reportable (i.e., were not > 2 volts) during EOC23. Only a small sample (< 5%) of cold leg and u-bend dents was examined with the rotating probe;

however, this sample included the maximum voltage dents reported in those regions of the tube bundle.

Of the three steam generators examined, one new dent was detected with the bobbin probe (SGB R1 C62 TSC+0.81"). This dent was subsequently examined with the +Point probe and dispositioned as no degradation found (NDF), and SSI of the no-tube lane confirmed that no objects were present which could have caused the dent.

#### **NRC Question 4**

*In Table 9, there are several indications in SG B that showed a change between a prior inspection and the 2010 inspection. For these locations, no foreign object is listed at these locations. Were these locations visually inspected? Was a loose part or parts removed from these locations? If not, what caused the change in the eddy current signal? What were the magnitudes of the changes in the signal? If these indications continued to grow, would the tubes still have adequate integrity at the time of the next inspection?*

#### **Dominion Response**

An extensive visual examination of the BPH region was performed, and this examination determined that no foreign objects were present; hence, no foreign objects were removed from this area. The wear indications were attributed to migratory foreign object(s) (i.e., foreign objects which have relocated within the SG or have been removed by the combined effects of upper bundle flushing and sludge lancing). The determination of signal change was based upon a visual comparison of the bobbin probe signals from previous and current inspections. It was necessary to perform the comparison using bobbin probe data because rotating probe examinations were not previously performed at these locations. As such, this process is somewhat subjective and does not yield voltage or percent throughwall magnitudes that can be compared mathematically. The signal changes based on this process are likely the result of the normal limitations of eddy current repeatability. Even if it is assumed that the indicated wear continues to grow at the rate inferred from the fact that signals were present no less than two cycles prior to the 2010 inspection, all of the tubes in questions will meet the performance criteria (including tube integrity) at the time of their next inspection during the fall 2013 outage.

#### **NRC Question 5**

*Were any other secondary side inspections (other than those listed on page 4) performed (e.g., steam drum)? If so, discuss the scope and results of these inspections.*

#### **Dominion Response**

The feedring replacement work performed in each SG was followed up with a general feedring region visual inspection and FME close-out inspection of the steam drums. No indications of degradation were identified.