VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

June 7, 2010

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

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Docket No. 50-280
License No. DPR-32

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNIT 1
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
2009 STEAM GENERATOR INSERVICE INSPECTION REPORT

By letter dated November 4, 2009 (ML093200207), 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 spring 2009 refueling outage. After review of the provided information, the NRC staff determined that additional information is required to complete their review. The NRC's questions and Dominion's responses are provided in the attachment.

If you have any questions or require additional information, please contact Mr. Trace J. Niemi at (757) 365-2848.

Very truly yours,

B. L. Stanley
Director Nuclear Station Safety and Licensing

Commitments made in this letter: None

Attachment
Response to NRC Request for Additional Information Regarding 2009 Steam Generator Inservice Inspection Report, Surry Power Station Unit 1

A047
NRR

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ATTACHMENT

Response to NRC Request for Additional Information Regarding 2009 Steam Generator Inservice Inspection Report

Surry Power Station Unit 1

Virginia Electric and Power Company
(Dominion)

By letter dated November 4, 2009, (Serial No. 09-696), Virginia Electric and Power Company (Dominion) submitted information summarizing the results of the spring 2009 steam generator (SG) tube inspections performed at Surry Power Station Unit 1. On May 7, 2010, the NRC requested additional information related to the SG inspections. The NRC questions and Dominion's responses are provided below.

NRC Question 1

In the discussion of secondary side inspections performed in SG A, you note that two foreign objects (a wire and a small disc shaped object) could not be retrieved. Please discuss whether any wear was associated with these loose parts. Please clarify whether an analysis was performed to confirm that tube integrity near these foreign objects would be maintained until the next scheduled inspection. Please discuss whether the tubes adjacent to these parts were plugged and stabilized.

Dominion Response

The tubes bounding the location of both objects were examined with rotating plus point probes in the region where the parts were located (cold leg top-of-tubesheet), and none of the tubes had indications of wear in this region. The tubes adjacent to the objects were not plugged or stabilized. A detailed analysis of both objects was performed and the analysis confirmed that the integrity of the adjacent tubes would be maintained until the next scheduled inspection of these tubes (fall 2010).

NRC Question 2

In your discussion of inspections performed in the secondary side of SG A, you refer to the Post Deposit Minimization Treatment (DMT). Please provide a brief description of this process (e.g. purpose and description of chemicals used).

Dominion Response

DMT is a cleaning process designed to reduce the inventory of deposit material on the secondary side of SGs. Deposit inventory reduction helps reduce the potential for tube corrosion, tube support broach hole blockage, and steam pressure loss due to heat transfer surface fouling. The DMT process was applied to the three Surry Unit 1 SGs during the spring 2009 refueling outage and in concert with sludge lancing, removed a total of 2,217 pounds of iron oxide from the SGs. DMT utilizes a low concentration of oxalic acid which acts as a complexing agent in the dissolution of iron oxide deposits. A final passivation step employs lower concentration oxalic acid and hydrogen peroxide. The process results in very low corrosion rates for internal SG subcomponents.

NRC Question 3

Please confirm whether the tube in row 10 column 26 (R10C26) of SG C was plugged.

Dominion Response

The tube in row 10 column 26 (R10C26) in SG C was plugged during the spring 2009 refueling outage.

NRC Question 4

Please discuss any insights you have as to why the indication in R3C66, as shown in Table 6, was not identified during the 1997, 2001, and 2006 inspections.

Dominion Response

During the spring 2009 refueling outage bobbin probe examination, a distorted support indication (DSI) was identified in tube R3C66 at 05C-0.78". A follow-up plus point probe examination of the region confirmed that the DSI was the result of a wear flaw caused by a foreign object no longer present at the location. A review of the eddy current bobbin probe examination data acquired during the 1997, 2001, and 2006 outages was performed. It was determined that the bobbin signal present during the previous inspections was essentially the same as the bobbin signal observed and reported during the spring 2009 refueling outage. The flaw in question is relatively shallow (maximum depth: 26%TW) and produced a low amplitude eddy current signal (bobbin: 0.17 Volts). The detection of these types of flaws using the latest eddy current equipment which provides better signal to noise ratios has made it possible to detect indication of this magnitude without the noise interface. During recent years there has been heightened industry attention to the potential for foreign object wear within SGs; a point underscored by experiences documented in NRC Information Notices 2004-10, 2004-16, 2004-17, and Operating Experience Reports 19455, 27802, 29585 and others. Consequently, through the years there has been an increasing emphasis within the Surry site specific analyst performance demonstration program on foreign object and foreign object wear detection. This heightened emphasis has likely improved the NDE system detection capability and contributed to the 2009 detection of the flaw in R3C66.

NRC Question 5

The following abbreviations/acronyms are not defined; please provide definitions:

a. A-Codes
b. LPS
c. LPM

Dominion Response

A-Codes: Anomalous geometric conditions which are not indicative of tube degradation.

LPS: Loose part signal; a bobbin examination code indicating potential damage associated with a foreign object that was subjected to plus point examination and was determined to be

undamaged; also used to indicate that a reported eddy current possible loose part (PLP) indication was determined to be a false call based upon a visual examination of the location.

LPM: Loose part monitoring; indicates that a visual examination has determined that a loose part is present but a corresponding loose part signal is not present in the eddy current data.

NRC Question 6

In Table 3, please confirm that no Tier 1 tubes had indications of wear at the anti-vibration bars. Please confirm that there are only 33 Tier 2 tubes in SG A and 24 Tier 2 tubes in SG C.

Dominion Response

None of the Tier 1 tubes in any Unit 1 SG had indications of anti-vibration bar (AVB) wear. In SG A there are currently 160 Tier 2 tubes in-service, and in SG C there are 117 Tier 2 tubes in-service. As indicated in Table 3, the rotating probe examination scope expansion included a 20% sample of Tier 2 tubes in the top-of-tubesheet region. The quantities quoted in the question correspond to a 20% sample of Tier 2 tubes.

NRC Question 7

Please clarify the number of tubes with PTEs and the definition of a PTE.

Dominion Response

PTE is an abbreviation for "partial tubesheet expansion" and refers to a condition in which the tube is expanded into the tubesheet over some distance beyond the tack expansion but significantly less than the full thickness of the tubesheet. There are no PTE conditions in the Surry Unit 1 SG tubes.

NRC Question 8

For all but one flaw plotted in Figures 1 and 2, the as-measured flaw size was used. For the other flaw, the structurally significant flaw size was plotted. Please discuss how the curves in Figures 1 and 2 were determined (i.e., using the NDE uncertainty associated with the as-measured flaw dimensions or the structurally significant flaw dimensions). Please discuss why it is appropriate to use these curves to apply to both the as-measured flaw size and the structurally significant flaw size.

Dominion Response

The referenced condition monitoring (CM) limit curves (Figures 1 and 2) represent the steam generator tube structural integrity performance criteria as defined in Surry Technical Specifications. In accordance with EPRI Steam Generator Integrity Assessment Guidelines, Revision 3, the CM curves were developed using conservative allowances for material strength uncertainty, burst equation uncertainty, and NDE sizing uncertainty. The NDE sizing uncertainties reflected in Figures 1 and 2 correspond to the as-measured flaw dimensions for

EPRI NDE Examination Technique Specification Sheet techniques ETSS 27901.1 and ETSS 21998.1, respectively.

Each flaw is represented on Figures 1 and 2 by its length and depth. For all but one flaw (i.e., SGC R10 C26), the measured total length and measured maximum depth are plotted. The use of the total length and maximum depth in this manner is quite conservative because it assumes that the maximum indicated depth exists throughout the entire measured length. This simple approach is used for flaws which lie well below the CM curve. For deeper and/or longer flaws, this approach is discarded in favor of a more detailed evaluation which yields the structurally equivalent dimensions.

Structurally equivalent dimensions are based upon the depth profile of the flaw along the axis of the tube. The depth profile is determined using the same NDE techniques as above, but instead of only one value of depth being measured (i.e., the maximum depth), depth measurements are taken approximately every 0.030 inches along the axis of the tube throughout the extent of the flaw. Once the depth profile is available, the structurally equivalent rectangular flaw dimensions are determined using a technique described in EPRI Steam Generator Degradation Specific Management Flaw Handbook, Revision 1. A flaw with the resulting equivalent length and depth will burst at the same pressure as a flaw with the indicated depth profile.

Since the process of determining the structurally equivalent flaw dimensions utilizes the same NDE sizing technique as is used for determining the maximum dimensions, the impact of NDE sizing uncertainty on the CM limit is the same for both approaches. Hence, it is appropriate to plot the structurally equivalent size of the flaw in tube SGC R10 C26 on the CM curve of Figure 1.

NRC Question 9

Please discuss the results of your secondary side inspections, including whether any degradation was detected.

Dominion Response

SG A components in the upper two steam drum decks, primary and secondary separators, swirl vanes, drain pipes, deck attachment welds, ladders, etc., were visually inspected and found to be acceptable.

A portion of the upper tube bundle containing AVB's, the periphery of the 7th tube support plate (TSP) and the periphery of the 6th TSP were examined from the steam drum through three primary separator swirl vanes in SG A. This inspection provided documentation of the Unit 1 upper bundle conditions following the DMT process. The quantity of tube deposits, loose deposit material on the AVB surfaces in-bundle, and bridging at AVB/tube intersections was reduced. In-bundle top of 7th TSP and top of 6th TSP views also showed a decrease in the amount of surface deposition and deposits in the broached openings. No material degradation was observed.

The 26 SG A J-nozzle/ feedring interfaces were visually inspected (by inserting the video probe into the J-nozzle and looking back at the weld) with only minor flow assisted corrosion (FAC) related material reduction observed.