

December 8, 2008

Mr. David A. Christian
President and Chief Nuclear Officer
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: SURRY POWER STATION, UNIT NO. 1, 2007 REFUELING OUTAGE STEAM
GENERATOR TUBE INSPECTIONS (TAC NO. MD8779)

Dear Mr. Christian:

By letter dated May 21, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML081560216), Virginia Electric and Power Company, Inc. (the licensee), submitted the steam generator (SG) tube inspection report for Surry Power Station, Unit No. 1, fall 2007 refueling outage. Additional information regarding the 2007 SG tube inspections was provided by the licensee in a letter dated October 9, 2008 (ADAMS Accession No. ML082970192).

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of the report and concludes that the licensee provided the information required by their technical specifications and that no additional follow-up is required at this time. The NRC staff's review of the report is enclosed.

Sincerely,

/RA/

John Stang, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-280

Enclosure:
Inspection Summary Report

cc w/encl: Distribution via Listserv

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ADAMS Accession No. ML083380628

*transmitted by memo dated

OFFICE	NRR/LPL2-1	NRR/LPL2-1/PM	NRR/LPL2-1/LA	NRR/DCI/CSGB/BC	NRR/LPL2-1/BC
NAME	DWright	JStang	MO'Brien	AHiser	MWong (LOlshan for)
DATE	12/8/08	12/8/08	12/8/08	11/24/08*	12/8/08

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OFFICE OF NUCLEAR REACTOR REGULATION
REVIEW OF THE 2007 REFUELING OUTAGE
STEAM GENERATOR TUBE INSPECTION REPORT
SURRY POWER STATION, UNIT NO. 1
DOCKET NO. 50-280

By letter dated May 21, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML081560216), Virginia Electric and Power Company, Inc. (the licensee), submitted information summarizing the results of the Surry Power Station, Unit No. 1 (Surry 1), fall 2007 refueling outage, steam generator (SG) tube inspections. Additional information was provided by the licensee in a letter dated October 9, 2008 (ADAMS Accession No. ML082970192). Previously, on November 1, 2007, and November 3, 2007, the Nuclear Regulatory Commission (NRC) staff participated in conference calls with the licensee regarding the 2007 SG tube inspections. The NRC staff summarized these calls in a letter dated December 11, 2007 (ADAMS Accession No. ML073380143).

Surry 1 has three Westinghouse model 51F SGs (A, B, and C) that were installed in 1981. Each SG nominally contains 3,342 thermally treated Alloy 600 tubes. Each tube has a nominal outside diameter of 0.875 inches and a nominal wall thickness of 0.050 inches. The tubes were hydraulically expanded at both ends for the full length of the tubesheet and are supported by a number of stainless steel tube support plates. The U-bends of the tubes installed in rows one through eight were thermally stress-relieved after bending.

The licensee provided the scope, extent, method, and results of the Surry 1 SG tube inspections in the documents referenced above. In addition, the licensee described corrective actions (i.e., tube plugging) taken in response to the inspection findings. Only the tubes in SG B were inspected during the 2007 outage.

The NRC staff noted the following as a result of reviewing the aforementioned submittals:

1. The Surry 1 SGs have accumulated approximately 250.4 effective full power months (EFPMs) of operation. At the time of the outage, the licensee had operated approximately 24 (EFPMs) in a 60-EFPM sequential inspection period.
2. A secondary side upper bundle flush, and subsequent lancing at the flow distribution baffle and top of tubesheet were conducted in SGs A, B, and C during the 2007 outage. Approximately 200 pounds of material were removed from all three SGs. Very few deposits were present in the broached hole openings (i.e., negligible effect on level flow behavior and pressure drop within the SGs).
3. The licensee stated that flow accelerated corrosion (FAC) was the only secondary side degradation identified. Visual inspections were performed in SG B on the internal J-nozzle feeding weld interface. These inspections showed evidence of minor FAC with minimal evidence of change from the previous visual examination performed in the SG in 2003.

Enclosure

FAC was also observed in the feeding. Ultrasonic thickness measurements were taken in all three SGs. These measurements indicated all regions exceeded minimum design requirements. The largest rate of thickness reduction since the last inspection in any SG was in the SG A inlet reducer (although the licensee considered the result to have significant uncertainty, based on difficulties associated with the inspections and the ability to inspect the exact same location). The next largest rate of reduction was observed in the right side elbow of SG A. The licensee indicated that the most-limiting component based on current thickness, rate of progression, and allowable minimum thickness is the downstream portion of the inlet reducer in SG A, which will require remediation or re-inspection at the end of the next cycle (i.e., end-of-cycle 22). The next most-limiting projection is the crossover pipe in SG B, which will require remediation or re-inspection by the end of cycle 25.

4. No tubes in rows one through eight in SG B have an eddy current offset that would be indicative of non-optimal tube processing. Twenty two large radius tubes (tubes in rows nine or higher) in SG B exhibit an offset that may be indicative of higher residual stresses as a result of the fabrication process. Rotating probes were used to inspect various locations in some of these tubes (including the hot-leg expansion transition in all of these tubes) and no degradation was identified.
5. In the NRC's December 11, 2007, letter to the licensee, the NRC staff indicated that three loose parts were removed from an area where volumetric indications had been detected and that one of these loose parts was leaning against one of the tubes where the volumetric indications were detected. However, in the licensee's submittals summarizing the results of the 2007 outage, the licensee clarified that no loose parts were found immediately adjacent to the three tubes with volumetric indications, but that one loose part was found approximately one tube away and two other loose parts were found approximately three and six tubes away.
6. No examinations were performed at Surry 1 in the tack expansion region, which is near the tube end. Since crack-like indications were observed in this region at another plant with similar tube material, the NRC staff questioned this practice as discussed in the NRC's letter dated December 11, 2007. In a letter dated October 14, 2008, the licensee requested an amendment to modify the repair criteria for flaws near the tube end (ADAMS Accession No. ML082980388).

Based on a review of the information provided, the NRC staff concludes that the licensee provided the information required by the TSs. In addition, the NRC staff concludes that there are no technical issues that warrant follow-up action at this time since the inspections appear to be consistent with the objective of detecting potential tube degradation (except as discussed above for the tack expansion region) and the inspection results appear to be consistent with industry operating experience at similarly designed and operated units.

Date: December 8, 2008