



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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June 30, 2011

Mr. David A. Heacock
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. 2 – 2009 REFUELING OUTAGE STEAM
GENERATOR TUBE INSPECTIONS SUMMARY FOR END OF CYCLE 22
(TAC NO. ME5689)

Dear Mr. Heacock:

By letter dated May 24, 2010, and a response to additional information dated April 25, 2011, Virginia Electric and Power Company (the licensee), submitted information summarizing the results of the 2009 steam generator (SG) tube inspections at Surry Power Station, Unit No. 2. Additionally, the U.S. Nuclear Regulatory Commission (NRC) held a follow-up phone call on May 12, 2011, with the licensee to clarify a few minor points of information.

The NRC staff has completed its review of this report and concludes that the licensee provided the information required by their Technical Specifications and that no additional follow-up is required. Enclosure 1 is the NRC staff's review of the report and Enclosure 2 is the licensee's Phone Call Notes.

Sincerely,

A handwritten signature in cursive script that reads "Karen Cotton".

Karen Cotton, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-281

Enclosures:

1. SG Tube Inspection Summary
2. SG Phone Call Notes

cc w/encls: Distribution via Listserv

SURRY POWER STATION UNIT NO. 2

2009 STEAM GENERATOR TUBE INSPECTION SUMMARY

DOCKET NO. 50-281

By letter dated May 24, 2010, Agencywide Documents Access and Management System (ADAMS) Accession No. ML101530533, and a response to a request for additional information (RAI) dated April 25, 2011, ADAMS Accession No. ML11124A009, Virginia Electric and Power Company (VEPCO, the licensee), submitted information summarizing the results of the 2009 steam generator (SG) tube inspections at Surry Power Station, Unit No. 2 (Surry Unit 2). Additionally, the U.S. Nuclear Regulatory Commission (NRC) held a follow-up phone call on May 12, 2011, with the licensee to clarify a few minor points of information, the details of which are summarized below.

Surry Unit 2 has three replacement Model 51F SGs that were installed in 1980. The replacement SGs were fabricated by Westinghouse. Each SG 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 1 through 8 were thermally stress relieved after bending.

The licensee provided the scope, extent, methods, and results of their SG tube inspections in the documents referenced above. In addition, the licensee described corrective actions (e.g., tube plugging) taken in response to the inspection findings.

On May 12, 2011, the licensee provided the following additional clarifying information, via a phone conference with the staff:

- Overexpansion (OXP) is an area of the tube within the tubesheet expanded more than 0.02 inches greater than the diameter of the unexpanded portion of the tube. This condition is generally associated with a locally high tubesheet bore diameter caused by a tubesheet bore drilling anomaly.
- An overroll (OVR) is an area of the tube that is hydraulically expanded more than 0.25 inches above the tubesheet.
- Phone call notes enclosed as an attachment.

Based on a review of the information provided by the licensee, via letter dated May 24, 2010, and response to the RAI dated April 25, 2011, the NRC staff concludes that the licensee provided the information required by their Technical Specifications. The SG tube inspections at Surry Unit 2 appear to be consistent with the objective of detecting potential tube degradation and the inspection results appear to be consistent with industry operating experience at similarly designed and operated units.

Notes for NRC Call Thursday May 12 @ 1 PM

1. The NRC staff requests clarification on the definition of over-expansion that was provided in your response dated April 25, 2011, Agencywide Documents Access and Management System, Accession No. ML11124A009 to a request for additional information regarding the End of Cycle 22 Steam Generator Tube Inspection.
 - OXP: Local area within tubesheet where diameter is larger than nominal
 - OVR: Local area above the tubesheet where diameter is larger than nominal

2. Discuss any trends in the amount of primary-to-secondary leakage observed during the recently completed cycle.
 - No reportable leakage and no increasing leakage trend.

3. Discuss whether any secondary side pressure tests were performed during the outage and the associated results.
 - No secondary side pressure tests were performed

4. Discuss any exceptions taken to the industry guidelines.
 - No exceptions were taken to industry guidelines

5. For each SG, provide a description of the inspections performed including the areas examined and the probes used (e.g., dents/dings, sleeves, expansion-transition, U-bends with a rotating probe), the scope of the inspection (e.g., 100% of dents/dings greater than 5 volts and a 20% sample between 2 and 5 volts), and the expansion criteria.
- ECT inspections will be performed in two SGs (B & C)
 - Includes:
 - Full length bobbin exam of all tubes (excluding row 1 and 2 ubends)
 - +Point inspection of 58% of hot leg expansion transitions
 - +Point inspection of 50% of hot leg OXPs and a small sample of the highest voltage cold leg OXPs
 - +Point inspection of all row 1 and 2 ubends
 - +Point inspection of 50% of 5 tube deep periphery on cold leg TTS
 - +Point inspection of 50% of hot leg dents ≥ 2 Volts and a small sample of the highest voltage cold leg dents
 - +Point inspection of special interest locations (eg, PLPs, I-codes, etc)
 - SG C ECT is complete; SG B is underway
 - Expansion criteria:
 - The only findings that have required expansion were PLP calls that were confirmed by +Point.
 - The expansion involves bounding the region with +point exams until a "clean" one-tube-deep ring is achieved.
 - No cracking was identified. No other degradation was identified that exceeded the plugging criteria or triggered scope expansion.
6. For each area examined (e.g., tube supports, dent/dings, sleeves, etc), provide a summary of the number of indications identified to-date for each degradation mode (e.g., number of circumferential primary water stress corrosion cracking indications at the expansion transition). For the most significant indications in each area, provide an estimate of the severity of the indication (e.g., provide the voltage, depth, and length of the indication). In particular, address whether tube integrity (structural and accident-induced leakage integrity) was maintained during the previous operating cycle. In addition, discuss whether any location exhibited a degradation mode that had not previously been observed at this location at this unit (e.g., observed circumferential primary water stress corrosion cracking at the expansion transition for the first time at this unit).

- Cracking:

- No indications of cracking have been identified

- AVB Wear (tubes / indications):

SG B	SG C
9 / 10	36 / 54

(SG C has historically had more AVB wear than B)

- Max depth identified: SGB 17 %TW; SGC 33 %TW
- Essentially dormant
 - Avg growth rate ~0 %TW/cycle
 - 95/50 growth rate is ~2 %TW/cycle (reflects NDE sizing uncertainty)
- Structural and leakage performance criteria were met during previous cycle

- Foreign object wear:

SG B:

- 3 FO wear flaws identified during previous outages were resized
- None of them changed
- No new FO wear identified
- Structural and leakage performance criteria were met during previous cycle

SG C:

- 21 FO wear flaws identified during previous outages were resized
- None of them changed
- Identified 4 new FO wear flaws at hot leg baffle plate (BPH)
 - Max depth 25 %TW
 - Data review shows small bobbin response with no change from 2008
- Identified 3 new FO wear flaws at hot leg TTS (adjacent to each other)
 - Max depth 27 %TW
 - Data review shows small bobbin response with no change from 2008

- Structural and leakage performance criteria were met during previous cycle
- Tube Support Wear:
 - SG B:
 - None
 - SG C:
 - 2 tubes have TSP wear
 - Each tube has one affected elevation:
 - R37 C73 TSP7 Cold Leg
 - Previously reported in 2005, although there is now a shallow reportable flaw at a second land contact (9 %TW)
 - Max depth 20 %TW, no change since 2005

 - R3 C72 TSP3 Cold Leg
 - Newly reported, however no bobbin signal change since 2005
 - Max depth 9 %TW

- Structural and leakage performance criteria were met during previous cycle

- New degradation modes:

- None

7. Describe repair/plugging plans.

- Thus far no tubes requiring plugging have been identified in either SG. Inspections are still underway.

8. Describe in-situ pressure test and tube pull plans and results (as applicable and if available).

- There are no plans for a tube pull or in-situ testing.

9. Discuss the following regarding loose parts:
 - what inspections are performed to detect loose parts
 - a description of any loose parts detected and their location within the SG (including the source or nature of the loose part, if known)
 - if the loose parts were removed from the SG
 - indications of tube damage associated with the loose parts
- Inspections
 - 100% bobbin probe exam SG B and C
 - +Point exams in hot leg and cold periphery
 - Secondary side visual inspections of regions identified during ECT
10. Discuss the scope and results of any secondary side inspection and maintenance activities (e.g., in-bundle visual inspections, feedring inspections, sludge lancing, assessing deposit loading, etc).
 - The feedrings in all 3 SGs were replaced during this outage
 - No sludge lancing was performed
 - Secondary side inspections in SGs B&C to investigate regions of interest identified during the ECT exam
 - Results:
11. Discuss any unexpected or unusual results.
 - New Dent:
 - A new dent was identified on a periphery tube in SG C
 - Location corresponds to 90 degree handhole
 - Caused by maintenance activity during 2008 or 2009 outage
 - Dent is relatively small (9.6 Volts) and did not restrict passage of 0.720 inch bobbin probe
 - Examined with +Point – no tube degradation

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Sincerely,

/RA/

Karen Cotton, Project Manager
Plant Licensing Branch II-1
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ADAMS Accession No.: ML11144A252

*memo dated 5/13/11

OFFICE	NRR/LPL2-1/PM	NRR/LPL2-1/LA	NRR/DCI/CSGB/BC	NRR/LPL2-1/BC	NRR/LPL2-1/PM
NAME	KCotton	MO'Brien (SLittle for)	RTaylor*	GKulesa (RMartin for)	KCotton
DATE	6/27/11	6/27/11	05/13/11	6/28/11	6/30/11

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