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U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D. C. 20555-0001

**Vogtle Electric Generating Plant, Unit 1  
Response to NRC Request for Additional Information  
Regarding the 2006 Unit 1 (1R13) Steam Generator Tube Inspections**

Ladies and Gentlemen:

On October 29, 2007, Southern Nuclear Operating Company (SNC) received a Request for Additional Information (RAI) from the staff concerning the Vogtle Electric Generating Plant (VEGP) 2006 Unit 1 (1R13) Steam Generator Tube Inspections. The SNC response to the subject RAI is enclosed.

This letter contains no NRC commitments. If you have any questions, please advise.

Sincerely,

A handwritten signature in black ink, appearing to read "D.H. Jones", is written over the word "Sincerely,".

David H. Jones  
Vice President – Engineering

DHJ/DRG/daj

Enclosure: Response to NRC Request for Additional Information (RAI)  
Regarding the 2006 Unit 1 (1R13) Steam Generator Tube  
Inspections

U. S. Nuclear Regulatory Commission  
NL-08-0100  
Page 2

cc: Southern Nuclear Operating Company  
Mr. J. T. Gasser, Executive Vice President  
Mr. T. E. Tynan, Vice President – Vogtle  
RType: CVC7000

U. S. Nuclear Regulatory Commission  
Mr. V. M. McCree, Acting Regional Administrator  
Mr. S. P. Lingam, NRR Project Manager – Vogtle  
Mr. G. J. McCoy, Senior Resident Inspector – Vogtle

**Vogtle Electric Generating Plant**

**Enclosure**

**Response to NRC Request for Additional Information (RAI)  
Regarding the 2006 Unit 1 (1R13) Steam Generator Tube Inspections**

**Enclosure**  
**Response to NRC Request for Additional Information (RAI)**  
**Regarding the 2006 Unit 1 (1R13) Steam Generator Tube Inspections**

**1. NRC Question**

**The first sentence on page 4 references the tube in SG2 row 66 column 1. Considering that this tube is not referenced in the table on page 4, please clarify whether the sentence should have referenced the tube in row 6 column 1 (which is in the table).**

**SNC Response**

The first sentence on page 4 should have referenced SG2 Row 6 Column 1 instead of SG2 Row 66 Column 1. The reference to SG2 Row 66 Column 1 is a typographical error.

**2. NRC Question**

**Please provide the scope and results of any secondary side inspections (including foreign object search and retrieval) performed during the 2006 outage.**

**SNC Response**

Five types of steam generator (SG) secondary side inspections were performed in the Vogtle 1R13 outage, which are described in paragraphs (1) through (5) below.

(1) SG Foreign Object Search and Retrieval (FOSAR) inspection

The inspection scope for the SG FOSAR inspections performed during the Vogtle 1R13 outage was the periphery of the bundle at the top of the tube sheet (TTS) and the no-tube-lane at TTS for all 4 SGs. All 4 SGs were found to be free of foreign objects and sludge, and no anomalous conditions were observed.

(2) FOSAR inspection at additional locations as specified in the DA

Additional locations were specified in the degradation assessment (DA) as follow-up to prior outage inspection results for SGs 1, 2, and 3. This inspection is performed to confirm that the loose parts that could not be retrieved from the SG are still at their previously identified location. If a loose part is missing, it is assumed that the loose part is at another location in the SG, and an engineering evaluation is performed to justify leaving the loose part in the SG. The engineering evaluation is conservative because the loose part has probably been removed from the SG by sludge lancing.

**Enclosure**  
**Response to NRC Request for Additional Information (RAI)**  
**Regarding the 2006 Unit 1 (1R13) Steam Generator Tube Inspections**

(3) Inspection of potential loose parts wear volumetric flaws

If possible, the volumetric indications potentially attributable to loose parts wear (which were detected in the 1R13 outage) were visually inspected on the secondary side. These inspections were performed in SGs 1, 2, and 3. No loose parts were identified in the visual inspection.

(4) Inspections using the Consolidated Edison Combined Inspection and Lance (CECIL) system

The CECIL system was deployed in the VEGP Unit 1 SGs for the purpose of cleaning and inspecting TTS after the 1R13 chemical cleaning was completed. The system was deployed down several hot leg side columns in the manway and nozzle sides in SGs 1 and 4, and in the nozzle side only in SG2. The initial inspections performed in CECIL deployment revealed that in SG2 there was minimal deposit left after the chemical cleaning. In SG1 and SG4 there were foreign objects and scale observed in the regions traversed by the CECIL wand. The inspections performed after CECIL cleaning revealed that no foreign objects were observed and minimal scale was observed.

(5) In-bundle inspections above the 7<sup>th</sup> tube support plate (TSP)

In-bundle inspections were performed in SG1 above the 7<sup>th</sup> TSP in CL and HL columns 64-65, 87-88, and 110-111, all rows. The columns were found to be free of foreign objects and sludge. The quatrefoil lobes and lands were clean and open. No anomalous conditions were observed in the 7<sup>th</sup> TSP inspection.

**3. NRC Question**

**You indicated that you inspected 25% of the bulges and overexpansions from 3 inches above to 17 inches below the top of the tubesheet on the hot leg in SG1 (26 tubes), SG2 (52 tubes), and SG3 (14 tubes). In SG4, you inspected 100% (78 tubes) of the population. Please clarify whether the total population of bulges and overexpansions in SG1, 2, and 3 are in 26, 52, and 14 tubes, respectively, or whether 25% of the bulges and overexpansions are in 26, 52, and 14 tubes, respectively.**

**SNC Response**

Approximately 25% of the bulges and overexpansions are in 26 tubes (SG1), 52 tubes (SG2), and 14 tubes (SG3). As a result of minor changes in inspection results from outage to outage, additional tubes with bulges and overexpansions were identified. The end result was that 27 tubes in SG1,

**Enclosure**  
**Response to NRC Request for Additional Information (RAI)**  
**Regarding the 2006 Unit 1 (1R13) Steam Generator Tube Inspections**

80 tubes in SG2, and 21 tubes in SG 3 were inspected. This represents over 25% of the bulges and overexpansions in each SG.

**4. NRC Question**

**Please clarify the scope of your dent and ding inspections. In particular, were all dents and dings greater than or equal to five volts on the hot-leg inspected with a rotating probe, or were just those in the u-bend examined?**

**SNC Response**

The base scope for the dent and ding inspections was to inspect all dents and dings in the SGs 2 and 3 U-bends which measured greater than or equal to 5 volts by bobbin with the rotating probe. To ensure adequate scope of dent and ding inspections, a small number (less than 10 per SG) of HL straight length dents and dings were added to the inspection scope in SGs 2 and 3 after the base scope was defined.

**5. NRC Question**

**Please provide the effective full power years (or months) for each of your inspections.**

**SNC Response**

SG tubing eddy current examinations were conducted in each of the following outages, with associated effective full power years (EFPY) elapsed from start of Vogtle Unit 1 commercial operation indicated with the associated outage:

- 1R1 inspection conducted at 1.14 EFPY,
- 1R2 inspection conducted at 2.28 EFPY,
- 1R3 inspection conducted at 3.61 EFPY,
- 1R4 inspection conducted at 4.85 EFPY,
- 1R5 inspection conducted at 6.17 EFPY,
- 1R6 inspection conducted at 7.52 EFPY,
- 1R7 inspection conducted at 8.78 EFPY,
- 1R8 inspection conducted at 10.11 EFPY,
- 1R9 inspection conducted at 11.57 EFPY,
- 1R10 inspection conducted at 12.93 EFPY,

**Enclosure**  
**Response to NRC Request for Additional Information (RAI)**  
**Regarding the 2006 Unit 1 (1R13) Steam Generator Tube Inspections**

- 1R11 inspection conducted at 14.33 EFPY,
- 1R12 inspection conducted at 15.68 EFPY,
- 1R13 inspection conducted at 17.08 EFPY.

**6. NRC Question**

**You indicated that 50% of the u-bends in rows one and two were inspected this outage. Please discuss the last time the u-bends in the remaining 50% were inspected.**

**SNC Response**

The remaining 50% of the Rows 1 and 2 U-bends in SGs 2 and 3 were last inspected in 1R11.

**7. NRC Question**

**In response to oxide removal patterns in several rows, you performed rotating probe examinations of several tubes. These inspections indicated shallow wall loss, which was possibly the result of ultrasonic energy cleaning that had been used in previous outages. Please discuss when this ultrasonic cleaning process was used and whether the indications of wall loss were detected with the bobbin coil (during this outage and in the outages after the ultrasonic cleaning process was applied.) If not detected with the bobbin probe, please discuss why not, since the sizes of the indications are comparable to the sizes of wear indications reported at Vogtle 1 and other plants. In addition, if these were not detected by bobbin, discuss the possibility that these indications may be attributable to some other degradation mechanism. Please discuss the extent to which tubes other than in this row may have been affected. Please discuss the purpose of this UT cleaning process.**

**SNC Response**

Ultrasonic Energy Cleaning (UEC) was performed in all 4 Vogtle Unit 1 SGs in both the 1R11 and 1R12 outages, and in SG1 only in the 1R10 outage. The tubes affected by the shallow wall loss were inspected with the bobbin probe, and the volumetric indications referenced in the question were detected in the 1R13 inspection. The prior inspection of these locations with the bobbin probe was during the fall 2003 outage (1R11) after UEC

**Enclosure**  
**Response to NRC Request for Additional Information (RAI)**  
**Regarding the 2006 Unit 1 (1R13) Steam Generator Tube Inspections**

was performed, with no indications of the shallow wall loss being detected. The bobbin inspection results in 1R13 were classified as differential freespan signals (DFS), which resulted in further characterization with the rotating probe. The detectability of the indications of shallow wall loss (all measured at 10% through wall or less) may have been improved by the chemical cleaning performed in 1R13, prior to the eddy current inspection. The indications have been attributed to UEC, because they are adjacent to the location of the UEC system ultrasonic transducers when deployed. The 1R13 bobbin examination was performed in the entire length of all tubes in SGs 2 and 3, with no additional volumetric indications potentially attributable to UEC being detected. Therefore, the Row 1 tubes identified in the table are the extent of the volumetric flaws potentially attributable to UEC. The purpose for UEC deployment in the Vogtle Unit 1 SGs was for removal of TTS scale deposit and scale collars.

**8. NRC Question**

**You indicated that all tubes with indications attributed to loose part wear were visually examined except for two tubes. These tubes were in row 66 column 1 (see previous question on whether this should be row 6 column 1) and row 39 column 46. If row 6 column 1 was not visually inspected, please clarify the statement that it was left in service as a result of not identifying any loose parts in inspections of tubes surrounding row 6 column 1.**

**SNC Response**

Based on the volumetric indication in SG2 Row 6 Column 1, the tubes neighboring this location were also examined using +Point probes. No additional wear was detected, and no foreign objects were detected in the eddy current inspections of the neighboring tubes. No potential loose parts (PLPs) were identified in the inspection of the subject tube. Therefore, based on these inspection results, it was concluded that there were no loose parts in the vicinity of SG2 Row 6 Column 1.

**9. NRC Question**

**Please discuss whether any tubes with both loose parts wear and confirmed loose parts (based on visual examination) were left in service. If so, discuss the basis for leaving these tubes in service. Please discuss the history and nature of the loose part wear indications in SG2 row 39 column 46.**

**Enclosure**  
**Response to NRC Request for Additional Information (RAI)**  
**Regarding the 2006 Unit 1 (1R13) Steam Generator Tube Inspections**

**SNC Response**

No tubes with both loose parts wear and confirmed loose parts were left in service. A review was performed of SG2 Row 39 Column 46 eddy current inspection results; this tube was removed from service in 1R13 due to a loose parts wear indication. The previous bobbin examination in SG2 was performed in the 1R11 outage (fall 2003). During that inspection, no volumetric indication was identified at that location. A current review of the 1R11 data shows a detectable indication sized retrospectively at a depth of 6% through-wall. Re-analysis of bobbin eddy current data preceding 1R11 shows a small signal as far back as 1997. No indication suggestive of a PLP was found in any of the inspection data for SG2 Row 39 Column 46.

**10. NRC Question**

**Please discuss the extent to which the indication in SG4 row 5 column 68 extends below the bottom of the expansion transition (given that this is an OD-initiated indication, which may be isolated from the environment).**

**SNC Response**

The indication in SG4 Row 5 Column 68 initiated slightly above the bottom of the expansion transition and continued downward into the tubesheet; therefore, the 0.46 inch long indication is almost entirely below the bottom of the expansion transition.

**11. NRC Question**

**Please discuss the purpose of the chemical cleaning (e.g., removing deposits from within quatrefoil shaped holes) and whether it was successful.**

**SNC Response**

The full-bundle chemical cleaning was performed to achieve the greatest reduction of risk that the deposit loading would hasten the on-set of tube corrosion and to eliminate the potential that severe secondary fouling would cause significant power reductions. The chemical cleaning along with the follow-up mechanical cleaning techniques removed 6819 pounds of

**Enclosure**  
**Response to NRC Request for Additional Information (RAI)**  
**Regarding the 2006 Unit 1 (1R13) Steam Generator Tube Inspections**

deposits. Based on the sludge removed and secondary visual inspection results, the chemical cleaning was successful.

**12. NRC Question**

**You indicate that you satisfied the accident-induced leakage performance criterion since presumably only one indication was predicted to leak and this leak rate was less than your acceptance limits. Please confirm that only the single axial indication was predicted to leak. In addition, confirm that you combined this leak rate with the leak rate from other sources (e.g., plugs) in determining that you met your condition monitoring limits.**

**SNC Response**

The single axial indication was the only indication predicted to leak. There was no other leakage factored into the calculation, including plug leakage. The technical basis for excluding plug leakage from the calculation is the Westinghouse qualification testing program for the Alloy 690 plugs, which are installed in the Vogtle SGs, in conjunction with confirmation of no plugs leaking by visual examination. There has been no primary-to-secondary leakage in the Vogtle Unit 1 SGs either in the current cycle or during the cycle preceding the 1R13 outage.