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DOMINION ENERGY SOUTH CAROLINA (DESC)
VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1
RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION REGARDING RF-25
STEAM GENERATOR TUBE INSPECTION REPORT

- References:
1. DESC Letter, "Special Report (SPR) 2020-002 - Steam Generator Tube Inspection Report," dated October 20, 2020 (ADAMS Accession No. ML20296A692)
 2. E-mail from NRC Senior Project Manager, Vaughn Thomas, "Summer, Unit 1-Final RAIs for the SG Tube Inspection Report Review," dated May 11, 2020 (ADAMS Accession No. ML21131A040)

In Reference 1, DESC submitted a Technical Specification required report related to steam generator inspections performed during the Virgil C. Summer Unit 1 Twenty-Fifth Refueling Outage (RF-25). In Reference 2, the NRC Staff provided a request for additional information (RAI) regarding this report. The enclosure to this letter provides the DESC responses to the RAI.

If you have any questions or require additional information, please contact Mr. Michael Moore at (803) 345-4752.

Sincerely,

A handwritten signature in black ink, appearing to read "George A. Lippard", written over a horizontal line.

George A. Lippard
Site Vice President
V.C. Summer Nuclear Station

Commitments contained in this letter: None

Enclosure: Response to NRC Request for Additional Information

cc: G. J. Lindamood – Santee Cooper
L. Dudes – NRC Region II
V. Thomas – NRC Project Mgr.
NRC Resident Inspector

Enclosure

Response to NRC Request for Additional Information

**DESC RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION
REGARDING VCSNS UNIT 1 RF-25 STEAM GENERATOR TUBE INSPECTION
REPORT**

NRC Request for Additional Information:

- 1. Please discuss if there was any degradation noted during the primary side visual inspections of the channel head bowl cladding and internal surfaces, performed on each SG.*
- 2. With respect to the secondary side inspections, please clarify the scope (i.e., whether they were in all three SGs) and results of the secondary side inspections performed.*
- 3. The December 14, 2020, response to the NRC's request for additional information on the fall 2018 SG tube inspection report (ADAMS Accession No. ML20349A326), stated that heavy deposit formations and tube denting were identified during the visual inspection of the top (9th) tube support plate (TSP) in each SG. It is stated in the spring 2020 SG tube inspection report that Deposit Minimization Treatment (DMT) cleaning was performed during RFO 25. Please provide additional detail regarding the extent of the deposit formations and provide any additional insights, including the extent of denting, you may have with regards to the denting that could be related to the heavy deposit formation.*
- 4. Section 6.0, "Tubes Plugged during the Inspection Outage," of the spring 2020 SG tube inspection report states that a total of 4 tubes were plugged; 2 tubes were preventively plugged in SG A due to TSP wear indications (neither exceeded the 40 percent plugging criterion) and 2 tubes (1 in SG A and 1 in SG B) were plugged due to possible loose parts (PLPs). Please clarify whether the PLPs were newly identified during RFO 25 and how many total PLPs there were in the two tubes.*

DESC Response to RAI 1:

As noted in the RF-25 Condition Monitoring and Final Operational Assessment, in response to NSAL 12-1, Revision 1, the visual inspection of the Steam Generator (SG) channel head bowl included inspections of the entire channel head internal surfaces. Specifically, the entire tubesheet, cladding, divider plate, and associated welds/components. This visual inspection confirmed that the channel head bowl in each SG was in satisfactory condition and identified no signs of degradation, rust, deformation, or abnormal conditions.

DESC Response to RAI 2:

As noted in Special Report 2020-02 - Steam Generator Tube Inspection Report, secondary side inspections (SSI) were performed during RF-25 for the top of the tubesheet (TTS), flow distribution baffle (FDB), and top (9th) tube support plate (TSP) in all three SGs. Inspection results from the RF-25 Condition Monitoring and Final Operational Assessment are discussed below.

Top of the Tubesheet (TTS) / Flow Distribution Baffle (FDB)

The Deposit Minimization Treatment (DMT) process results in removal of tube deposition. Therefore, post-DMT lancing was performed first on top of the FDB followed by lancing on the TTS. Prior to the removal of the lancing equipment at each location, quick look visual inspections were performed on the FDB and TTS to assess the thoroughness of the lancing process. After removal of the lancing equipment, post-lance SSI were performed.

The FDB post-lance inspections included inner bundle passes approximately every 20 columns (H/L and C/L). The TTS post-lance inspections included the no-tube lane, annulus regions, and inner bundle passes. Foreign object search and retrieval (FOSAR) inspections at the FDB and TTS were also performed as needed.

Other than foreign objects that were identified but did not cause tube wear, no abnormal conditions were identified during the TTS inspections. All foreign object-related findings resulted in either removal of foreign material or plugging of tubes for possible loose parts (PLP) located on the 1st TSP that could not be visually inspected.

Top (9th) Tube Support Plate (TSP)

Visual inspections of the top TSP (9th TSP) along the no tube lane region were performed in each SG. The inspections focused on general condition of the TSP looking for general condition of sludge/fouling of the no-tube lane, TSP ligaments, and low row U-bends. The inspection also looked for webbing or bridging between the tubes/broaches, tube-to-tube bridging and blocked/partially blocked flow/broached holes. Inner bundle passes (H/L and C/L) at right angles to the 9th support no tube lane was also performed to the extent possible. The results of these inspections identified no conditions adverse to quality.

DESC Response to RAI 3:

The V.C. Summer Steam Generator Secondary Side Management Evaluation (Framatome Maestro Evaluation), dated 11/13/2019 (prior to cleaning), describes that small, discrete deposit accumulation begins at the 3rd TSP and become more extensive at each higher support level. "More extensive" in this context means increased eddy current amplitudes as well as a greater number of affected broaches. The deposition predominantly affects the hot leg; however, at higher elevations the cold legs become more involved. The 9th TSP is the most

impacted support in all three SGs, at which a substantial portion of the hot leg broaches have large amplitude deposit indications, and more than half of the cold leg broaches have detectible deposit indications. The SG A deposition at all support levels is very similar in magnitude and distribution to that of SG B. SG C has experienced more advanced accumulation than SG A and SG B at all levels. In SG C, the hot leg broaches in both TSP 8 and TSP 9 are broadly affected by large amplitude deposit indications.

During RF-24 (Fall 2018), eight newly formed dents were identified at upper TSP intersections in the hot legs of SG B and SG C (one in SG B at 8th TSP, seven in SG C at 9th TSP). During RF-25, six new dents were identified in the hot leg of SG C (one at 8th TSP and five at 9th TSP). The dents were confirmed as newly formed by verifying that no dent signals were present in the previous eddy current inspection data. No wear has been identified at any of the dent locations. The Maestro Report concluded that, although no wear has been identified at the tubes, the most probable cause of the new dents is elevated crossflow resulting from flow restriction in the hot leg, primarily at the top two TSPs. This tube denting first identified in RF-24 was a driving factor for chemical cleaning performed in RF-25 (Spring 2020) that resulted in removal of 4,048 lbs of sludge through a combination of the DMT process and subsequent sludge lancing.

DESC Response to RAI 4:

From the RF-25 Condition Monitoring and Final Operational Assessment, there were two (2) tubes plugged due to PLPs. Both of these tubes had new PLP single indications whose locations were not accessible by SSI/FOSAR. These indications were at locations on the 01H TSP that do not have inspection ports.