

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

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United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington D.C. 20555

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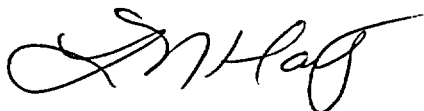
Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
ANNUAL STEAM GENERATOR INSERVICE INSPECTION SUMMARY REPORT
REQUEST FOR ADDITIONAL INFORMATION

Virginia Electric and Power Company (Dominion) submitted the Annual Steam Generator Inservice Inspection Summary Report for Surry Power Station in a letter dated February 28, 2002 (Serial No. 02-072). The report included the inspection results for the Surry Unit 1 steam generator inspections conducted during the Fall 2001 refueling outage. During their review of the subject report, the NRC staff requested a conference call to discuss the information provided. A conference call was held on January 9, 2003 to discuss several questions provided by the staff. At the conclusion of the call, it was agreed that Dominion would provide a written response to the NRC questions on the docket. Consequently, Dominion's response to the NRC request for additional information is provided in the attachment.

If you have any questions or require additional information, please contact us.

Very truly yours,



L. N. Hartz
Vice President – Nuclear Engineering

Commitments made in this letter: None

Attachment

A047

cc: U.S. Nuclear Regulatory Commission
Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
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R. A. Musser
NRC Senior Resident Inspector
Surry Power Station

Attachment

Response to NRC Request for Additional Information Surry Unit 1 2001 Steam Generator Examination Documented in the Surry 2002 Annual Steam Generator Report

1. *The licensee identified a volumetric-type "PIT" indication in tube R8, C38. Please respond to the following questions regarding this indication.*
 - A. *Is this pit-like indication representative of active degradation? If not, why was the indication not identified in previous inspections?*
 - B. *In response to Generic Letter 97-05, the licensee indicated that the Surry Unit 2 steam generators contained six cold leg pit indications. These similar pit-like indications of equal and lesser wall penetration were plugged during previous inspections due to uncertainty in non-destructive sizing estimates. Given this, and the fact that the exact cause of degradation of the pit in tube R8, C38 is not known, explain why this tube was not taken out of service.*

Response

The subject indication (R8-C38 @ Hot Leg Top-of-Tubesheet +0.35"), as stated in the referenced report, was likely due to a foreign object. The indication was detected during the planned top-of-tubesheet rotating coil sample inspection program. The rotating coil exam showed no indication of corrosion-related degradation and clearly showed it to be volumetric in nature. The indication was designated as a "PIT" call due to its localized volumetric nature, but the indication did not exhibit the specific characteristics and morphology of previously confirmed "PIT" indications on Surry Unit 2. For example, it was a single indication as opposed to several overlapping small pits on a localized area of the tube as exhibited on Unit 2. The indication was sized at 15% through-wall (TW) with a plus point probe using an industry qualified sizing technique (i.e. EPRI ETSS 21998.1) that was considered by the Dominion and vendor NDE Level III personnel to be conservative for use on the subject indication. No foreign object(s) remains in the area as confirmed by 100% bobbin eddy current and additional rotating coil exams in the immediate area from the referenced sample rotating coil program.

In addition, the morphology was more clearly defined than on the small number of "PIT" indications in the twelve (12) plugged tubes previously observed and reported on Unit 2. Also, the observed indications, as with observations on other units, indicate that pits typically occur at the edge of sludge/scale interface to the tube freespan (i.e. approximately 3-6 inches above the top-of-tubesheet). This indication was identified below that region. The referenced tube remains in-service because 1) the indication was significantly less than the plugging limit, 2) no foreign objects

remained in the area and thus no growth is expected, and 3) rotating exams confirmed no corrosion-related degradation.

2. *In Table 2 of the February 28, 2002 report several indications are characterized as "Not Confirmed". Please clarify note #4 regarding this characterization.*

Response

It was determined during the conference call that no additional information was required for this item.

3. *Please respond to the following questions regarding "dent" indications.*

- A. *A total of 75 tubes required resolution using a Plus Point probe because there was no historical data for the dents in these tubes. Are these new dents? If these are new dents, discuss the cause of and your evaluation of the denting since this is unusual for this model steam generator. If these are not new dents, explain why there is no historical data available.*

- B. *The report states that the 28 dent indications at the 6th and 7th tube support plates are not representative of the denting issue and resultant corrosion degradation associated with drilled carbon steel plates. Please provide additional details for the basis of this statement.*

Response

- A. In this context, "no historical data" means that signal data was not available in a readable format such that an acceptable history review and disposition of the indication call could be made. Dominion analysis guidelines conservatively require two previous raw signal data reviews to evaluate an indication for change. These signals are typically present due to pre-existing manufacturing conditions and are tracked over time for potential change. Such conditions are not unusual in replacement steam generators. The resolution threshold for indications requiring disposition was lowered for the subject outage from a bobbin voltage value of 5.0 volts to a value of 3.0 volts. Reporting of dent ("DNT") signals down to 2.0 volts was also added to increase available history information. The reported signals were typically existing "DNT" calls found in history from the available 1997 100% bobbin inspection. Since the population was relatively small, it was more efficient and conservative to conduct a rotating coil exam rather than reformatting the 1986 100% bobbin inspection data into a more usable form to conduct further history review.

- B. With regard to the statement concerning observed "DNT" signals at the upper support plates, the Surry units contain broached hole stainless steel tube support plates (TSP). Hence, denting caused by the buildup of deposits in the tube-to-crevice area is not considered to be a plausible mechanism that would significantly reduce tube diameter and induce related mechanical stress. Consistent with the analysis criteria of other "DNT" signals, the referenced signals are subject to the same history review as that noted in response 3.A above. Similarly, the reduction in the reporting threshold for signals to 2.0 volts and greater would have also added "new" calls to the population.

The purpose of the investigations on this sub-population of "DNT" signals was to evaluate the voltage signal change from previous inspections. Some indications progressed from under 2.0 volts to 2.0 volts and greater, which is beyond the current reporting threshold. Other indications already exceeding 2.0 volts had grown in voltage. However, the level of concern with respect to inducing damage on the tube is considered minimal since the range of observed voltages on this generator at the 7th TSP is 2.0 to ~6.0 volts with the average being 3.2 volts. In addition, all locations at the referenced TSP locations were able to pass the standard 0.720" diameter bobbin probe during the initial screening exam. As noted in the annual report, the dents at TSP's 6 and 7 of 3.0 volts and greater were examined with a plus point rotating coil and determined to be free of degradation. If deposits such as magnetite existed, it would have been easily detected with both bobbin and rotating coil inspections. With corrosion deposits ruled out, the denting must be of mechanical origin and will be tracked over time for changes.

4. *The licensee identified an indication at the apex of tube R10, C44 with a bobbin probe. The licensee believes that the indication is a wear indication resulting from contact with the V shaped tip of the anti-vibration bar.*
- A. *The licensee stated that attempts to characterize the indication in tube R10, C44 with a Plus Point probe were unsuccessful because the bobbin portion of the probe would not fit through the U-bend. However Plus Point inspections were successfully performed on smaller radius U-bends. Explain this apparent discrepancy.*
- B. *Given that the licensee did not characterize this indication and could not definitively determine the cause of the indication, describe the basis for the conclusion that the sizing estimate of 16 % through wall is conservative. Was in situ pressure testing considered?*

Response

- A. The rotating probe that was used for the R10 C44 tube exam was not the same probe that was used for the smaller radius U-Bend tube exams. During the resolution of the required rotating coil exams of other freespan bobbin calls, an attempt was made to gather further information on the anti-vibration bar (AVB) indication for future reference. The configuration of this probe would not allow passage of the probe to the affected area due to the physical dimension of the associated hardware (i.e. motor unit, etc.). The smaller probe used on the Row 1 U-Bends would not reach the area of concern.
- B. There is no requirement in the analysis guideline to perform a follow-up inspection with a rotating coil for characterization since the bobbin probe utilized is qualified for detection and sizing. A similar indication was detected and characterized with rotating coil inspection in Unit 1 "C" steam generator at a prior outage. The bobbin signature of this type of indication is easily recognized. One such indication has also been observed on Unit 2 and was similar in nature. As noted, bobbin probes provide accurate sizing of wear-type indications, and this information is used in formulating plugging decisions. The three referenced indications have been preventively plugged due to the slightly higher growth rate/cycle (i.e. 5 – 7 % TW) versus that seen on typical tube wear at AVB contact points (i.e. 2.5 – 3 % TW/cycle avg.).
5. *The licensee identified wear indications in row 1 tubes which were attributed to the sludge lance monorail. The licensee stated that based on industry experience, along with the results of the A steam generator inspection, no tubes in the Unit 1 B or C steam generators (which were not inspected) would be expected to have burst capabilities less than the required 3 times normal operating pressure differential. Given the variability in the depth of the wear marks at Surry and Plant "X" (i.e., 8 to 31 percent through wall), please describe in more detail the basis for the conclusion that the indications in the Unit 1 B and C steam generators are not more severe.*

Response

The observed indications on the Surry Unit 1 "A" steam generator, as noted in Table 2 of the Annual Report, were consistently similar and somewhat smaller than the most limiting indications at the other plant. When the tubes were damaged by the monorail during the Surry Unit 1 April 2000 outage, the Surry "A" steam generator was the first steam generator that was sludge lanced. The subsequent generators lanced (i.e. "B" & "C") would be expected to have similar or less damage than "A" due to wearing of the components in contact with the tube. Since significant laboratory test work had been successfully completed to support the structural assessment at the other plant and the source of the wear is not present any longer, expanded inspection into the other generators at Surry was not considered

necessary. Assessment of the "B" and "C" steam generators will be conducted during their next scheduled inspections. The "B" steam generator inspection is currently scheduled for the Spring 2003 refueling outage.

6. *A total of 74 freespan locations were inspected with a rotating probe because the bobbin coil data had changed significantly or had insufficient historical data. The licensee attributes these indications to manufacturing buff marks (MBM), local geometric variations (LGV), or dents (DNT) introduced during the manufacture of the steam generator.*

A. Why is no historical data available if these signals were created during the manufacturing of the steam generator?

B. How does the licensee quantify a "significant" change in these indications? Are the comparisons made against the original baseline data? If not, describe what data is used for the comparisons.

Response

A. The baseline data resides on magnetic tape and was used with analog test equipment. It is not readable with current digital equipment. In addition, the data is noisy and not suitable for comparison with modern digital data. Therefore, as noted in Response 3 above pertaining to "DNT" signals, the analysis guidelines require that bobbin signals from two previous in-service inspections be available to compare signals. In this case, data was not readily available from two previous inspections; therefore, rotating coil examination of the dent indications was performed. No corrosion degradation was observed.

B. The definition of "significant change" as noted in the Dominion analysis guidelines is as follows:

- Change in voltage => Greater of ¼ volt or 10% of recorded voltage
- Change in phase angle => 15 degrees

(Note: This parameter has recently been changed to 10 degrees and is planned to be implemented at the upcoming Surry Unit 1 2003 Spring Outage)