

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

April 6, 1978

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Mr. Edson G. Case, Acting Director
Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Serial No. 182A
PO&M/DLB:das
Docket No. 50-281
License No. DPR-37

Attention: Mr. Albert Schwencer
Operating Reactors Branch 1

Dear Mr. Case:

The attachment to this letter includes information on the recent steam generator inspection on Surry Unit No. 2 and is a supplement to our submittal of April 4, 1978 (Serial No. 182).

Very truly yours,

C. M. Stallings

C. M. Stallings
Vice President - Power Supply
and Productions Operations

Attachment

cc: Mr. James P. O'Reilly

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STEAM GENERATOR TUBE INSPECTION PROGRAM
AND PLUGGING CRITERIA

SURRY POWER STATION UNIT NO. 2

The following information is provided to supplement our previous submittals of February 15, 1978 (Serial No. 074) and April 4, 1978 (Serial No. 182).

- 1) Clarification of Figure 4 of attachment to our letter of April 4, 1978.

Figure 4 of the attachment to our April 4, 1978 letter is the same figure as Figure 1 of our February 15, 1978 letter. As explained in our February 15, 1978 letter the dashed line defines the extent of tube gauging in the cold legs. This included all tubes below the dashed line. The solid line defines the extent of gauging in the hot legs. This includes all tubes outside the crosshatched area.

- 2) Our submittal of April 4, 1978 included the following typographical errors.

- a) On page 1 of the attachment, the fifth sentence in the first paragraph should read as follows:

It has been established that the 15% strain contour is the most appropriate inspection boundary for the Surry Units.

- b) On page 2 of the attachment, under "3. Plugging Criteria", the second sentence in the first paragraph should read as follows:

This is consistent with the conservative inspection boundary of the 15% strain contour.

- c) In Figures 5, 6, and 7 the legend should read as follows:

X = .540" Probe

Δ = .610" Probe

□ = .650" Probe

- 3) This inspection revealed three leaking tubes, one in each steam generator.

Steam Generator A, Row 28, Column 10.

As shown in Figures 1, 2a, and 2b this tube is located on the periphery at a wedge location.

5) Inspection Boundary

Initially the 12.5% strain boundary was used in the gauging program when little plant specific data was available. After two initial inspections and three reinspections of the Surry plants, we now have the benefit of plant specific information which indicates the conservatism of the 12.5% boundary and the adequacy of the 15% boundary. That is, the majority of the tubes inspected do not restrict the .650 inch probe. In addition, all tubes restricting the .610 inch or .540 inch probe have all fallen well within the inspection boundary including the 15% strain boundary. This is significant since the .610 inch and the .540 inch restricted tubes form the basis for the plugging patterns in the tubelane region.

Furthermore, the following additional conservatisms were utilized in determining the Surry 2 inspection boundary:

- A. The 15% strain boundary indicated by the finite element model at 11.5 EFPM beyond full closure was used. The plant is currently at approximately 9 EFPM beyond full closure.
- B. In the flow slot area it is estimated that the 15% strain boundary at 11.5 EFPM beyond full closure extends to approximately the 9th row. The inspection boundary for this inspection extended to the 12th row in order to be consistent with previous inspection plans.
- C. When a restricted tube was found close to the inspection boundary, the inspection was expanded in that area.

It is concluded from the above that the inspection boundary was more than adequate.

- 6) The progression of strain contours over the intended operating period is utilized to preventively plug beyond a 0.540 inch restricted tube. In earlier inspections the closeness of the strain contour lines prevented identification of the appropriate contour which most reasonably indicated the extent and progression of tubes with greatest deformation. Initially, the 15% strain contour was chosen when limited plant specific data was available and the strain contour lines indicated by finite element analysis fell close together on the plots. A review of the relationship between the 0.540 inch restricted tubes at Surry 2 at this time and the finite element analysis strain contours at 8.5 EFPM beyond full closure indicates that the 17.5% strain contour more realistically estimates the boundary of 0.540 inch restricted tubes. Also the movement of the 17.5% strain contour over the next period of operation in the central tubelane region is less than two rows in six months. This is consistent with the plugging criteria previously used for Surry 1 and 2 and hence these plugging criteria were utilized for this outage.

As explained on page 3 of our April 4, 1978 submittal, due to local plate cracking which is believed to occur at the periphery near wedge locations, tube leaks can occur here at levels of tube restriction less than in the tubelane region. This tube leak was extremely small and was below the level detectable by chemical analysis:

All tubes surrounding this leaking tube were inspected with a .650 probe with satisfactory results. All surrounding tubes have been plugged. This is consistent with our plugging criteria defined on page 3 of our April 4, 1978 submittal and should preclude further tube leaks in this area during the next operating period.

Steam Generator B, Row 10, Column 91.

This leak was detected during operation and was approximately 0.25 gpm at the time of shutdown. This leak was clearly in an area where leaks are predicted to occur. Surrounding tubes have been plugged consistent with our preventive plugging criteria specified on page 3 of our April 4, 1978 letter. This should preclude further tube leaks in this area during the next operating period.

Steam Generator C, Row 4, Column 35.

This tube leak was extremely small and was below the level detectable by chemical analysis. This leak was clearly in an area where leaks are predicted to occur. Surrounding tubes have been plugged consistent with our preventive plugging criteria specified on page 3 of our April 4, 1978 letter. This should preclude further tube leaks in this area during the next operating period.

4) Handhole Inspection Results

Handhole inspection using photographs were performed in all steam generators. As explained in prior submittals, the flow slots in all steam generators have reached the point of full closure. The "islanding" phenomena described in previous submittals has also been observed to various degrees in all steam generators. This inspection was to verify that the support plates had undergone no further degradation since the last inspection and that no new phenomena had developed. Inspection revealed that the condition of the visible support plates had not changed since previous inspections and that no new phenomena were observed. The photographs will be available for inspection at the site.