

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

September 12, 1991

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

Serial No. 91-476
NES/AVB R3
Docket Nos. 50-280
50-281
50-338
50-339
License Nos. DPR-32
DPR-37
NPF-4
NPF-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
NORTH ANNA POWER STATION UNITS 1 AND 2
RESPONSE TO NRC BULLETIN 88-11
PRESSURIZER SURGE LINE THERMAL STRATIFICATION

Virginia Electric and Power Company submitted plant-specific responses to NRC Bulletin 88-11 in our letters dated April 28, 1989 (Serial No. 89-006), May 3, 1989 (Serial No. 89-006A), November 13, 1989 (Serial No. 89-006B), July 5, 1989 (Serial No. 89-006C), and August 17, 1989 (Serial No. 89-006D). We received your August 8, 1991 letter to which the Safety Evaluation Report (SER) of WCAP-12639 (WOG report) was an attachment. In your letter, you requested that we confirm that our response to Bulletin 88-11 was complete for Surry and North Anna Power Stations. The requirements of Bulletin 88-11 have been addressed through our plant-specific inspections and analyses. A summary of the results of those inspections and analyses, submitted by our referenced letters, demonstrates full compliance with the Bulletin.

The methodology used in our plant-specific evaluation is similar to that which has been accepted by the NRC staff and its consultant in reviewing the WOG report. Our plant-specific analyses utilized the specific "as-built" configuration of our pressurizer surge lines with respect to material and geometric parameters (layout of piping, support locations and types, working ranges of spring hangers and snubbers, and gaps at the rupture restraints, etc.). The axial temperature profiles used in the plant specific analysis is nearly identical to one developed by WOG. Linear cross-sectional temperature profiles used in the analysis were the same as those used by the WOG. Also, the plant-specific analyses utilized updated transients based upon information from an operational review and results of actual plant monitoring data. Additional monitoring data were collected during a limited number of heatups and cooldowns

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even after the analyses had been completed. The data were used to further corroborate the transient cycles used in the analyses. It was determined that the stratification cycles used in the analyses bounded the data collected from monitoring. The striping effects are relatively small and the plant-specific and WOG analyses are comparable.

As requested in your letter dated August 8, 1991, we are further summarizing our earlier response by referring to the actions required by the Bulletin. The specific actions required by the Bulletin and our responses are summarized below:

Action 1.a- Conduct a visual inspection (ASME Section XI, VT-3) to determine any gross discernible distress or structural damage in the entire surge line including piping, supports, whip restraints and anchor bolts.

Response 1.a- Virginia Electric and Power Company conducted visual inspection of the pressurizer surge lines. No gross discernible distress or damage attributable to thermal stratification was identified for the surge line piping, supports, restraints, or anchor bolts. In addition, ultrasonic (UT) examination of the pressurizer surge line welds, adjacent to the reactor coolant hot leg piping, was performed and no relevant indications in the surge lines were observed.

Results of the inspections were submitted in the following letters:

Surry Units 1 and 2 Letter Serial Nos. 89-006A (Attachment 2) and 89-006B (Attachment 2)

North Anna Unit 2 Letter Serial Nos. 89-006 and 89-006A (Attachment 1)

North Anna Unit 1 Letter Serial Nos. 89-006A (Attachment 1) and 89-006D

Action 1.b- Demonstrate that the surge line meets the applicable design codes (Fatigue analysis to be performed per the latest ASME Section III requirements including high cycle fatigue) for the life of the plant, considering thermal stratification and striping.

If the analysis does not demonstrate compliance with the requirements, submit a justification for continued operation (JCO) and implement actions 1.c and 1.d.

Response 1.b- Stress and fatigue analysis considering effects of thermal stratification and thermal striping was performed in accordance with the 1986 edition of the ASME Code Section III, Subsection NB with addenda through 1987. The results of this analysis demonstrate that the pressurizer surge line for each unit meets the applicable ASME Code requirements.

The analysis, performed using the worst case anticipated thermal stratification and striping, indicated that no hardware modifications were required on pressurizer surge lines at Surry Units 1 and 2 and North Anna Unit 1. The spring hangers supporting the surge lines and rupture restraints on both Surry units have been reset to allow for unrestricted movement of the line. The North Anna Unit 2 pressurizer surge line required a modification to one spring hanger to allow greater anticipated deflection of the line. This modification was made.

The loads on the equipment nozzles were acceptable per the manufacturer's specification/review. The loads on the supports and integral welded attachments were reviewed and found acceptable.

Results of the analyses were submitted in the following letters:

Surry Units 1 and 2 Letter Serial Nos. 89-006A (Attachment 2) and 89-006B (Attachment 2)

North Anna Unit 2 Letter Serial Nos. 89-006A (Attachment 1) and 89-006C

North Anna Unit 1 Letter Serial No. 89-006A (Attachment 1)

Action 1.c- If the analysis in 1.b does not show compliance, instrument pressurizer surge line as an alternative to obtain plant-specific data on stratification and striping for analysis.

Action 1.d- Update the stress and fatigue analysis to show code compliance incorporating any observations from the visual inspection. The analysis should be based on applicable plant-specific or referenced data and should be completed within two years. If detailed analysis is unable to show compliance, submit a JCO and a description of corrective actions for effecting long-term resolution.

Response- Since the inspections of Action 1.a and the analysis of Action 1.b fully satisfied the requirements of the Bulletin, no response to Actions 1.c and 1.d was necessary.

For the purpose of further verification, instruments were installed on the surge line for each unit to collect plant-specific data on thermal stratification, thermal striping, and line deflections. A series of temperature measurements were taken for the fluid in the system and the temperature on the pipe surface during plant operating events when thermal stratification is supposed to be significant. Displacement measurements were also taken at salient points to verify the effect of stratification in the surge line.

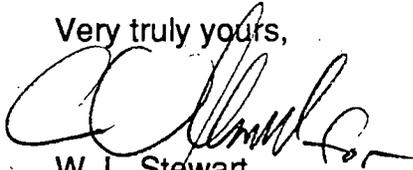
Data collected during a limited number of heatups and cooldowns indicates that the stratification cycles specified in the analysis envelop the data obtained from the measurements. The same conclusion is also reached from the displacement measurements.

Available plant operating history of the reactor coolant system was reviewed along with present operating conditions. The effect of stratification during the past operation was considered the same as the present operation. Recognizing the importance of the maximum temperature difference between the pressurizer and the reactor coolant hot leg (system ΔT) on the stratification in the surge line, steps were taken to exercise control over system ΔT during future operations. Plant operating curves for heatup and cooldown were revised to limit the system ΔT to a value smaller than that used in the analysis. The change was recorded in the UFSAR to establish an administrative control on the system ΔT . Our review also established that no change to the Technical Specifications will be required.

In summary, we believe that we have completed the action items required in order to fully address NRC Bulletin 88-11.

Should you require additional information, please contact us.

Very truly yours,



W. L. Stewart
Senior Vice President - Nuclear

cc: U. S. Nuclear Regulatory Commission
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Mr. M. W. Branch
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Surry Power Station

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COMMONWEALTH OF VIRGINIA)
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COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by E. W. Harrell, who is Vice President - Nuclear Operations, for W. L. Stewart, who is Senior Vice President - Nuclear, of Virginia Electric and Power Company. He is duly authorized to execute and file the foregoing document in behalf of that Company, and the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 12 day of September, 1991.

My Commission Expires: May 31, 1994.

Vicki L. Nuss
Notary Public

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