

VIRGINIA ELECTRIC AND POWER COMPANY  
RICHMOND, VIRGINIA 23261

December 3, 2002

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555

Serial No. 02-693  
NAPS/JHL R1  
Docket Nos. 50-338/339  
License Nos. NPF-4/7

Gentlemen:

**VIRGINIA ELECTRIC AND POWER COMPANY**  
**NORTH ANNA POWER STATION UNITS 1 AND 2**  
**SPECIAL REPORT - DIFFERENTIAL SETTLEMENT BETWEEN THE SERVICE**  
**WATER PUMPHOUSE AND SERVICE WATER PIPING IN THE VAULT NORTH OF**  
**THE PUMPHOUSE**

In our letter dated April 3, 2002 (Serial No. 02-203) you were notified that a more restrictive settlement limit had been established due to the temporary replacement of metal expansion joints with pipe spool pieces in the service water lines in the vault north of the Service Water Pumphouse. On October 8, 2002, the cumulative differential settlement between the Service Water Pumphouse (settlement marker (SM) 7) and the monitoring point on Service Water line 36"-WS-1-151-Q3 (SM-18R) was confirmed to exceed 75% of the revised allowable value, 0.145 feet. The cumulative differential settlement between SM 7 and 18R determined during the performance of periodic test procedure 0-PT-112, Category 1 Structure – Settlement Monitoring, was 0.111 feet, which is 76.5% of the revised limit of 0.145 feet. This Special Report is being submitted pursuant to the requirements of the Technical Requirements Manual.

Technical Requirement (TR) 3.7.7 addresses monitoring of settlement of Class 1 Structures, and includes allowable limits on differential settlement between the Service Water Pumphouse and the service water lines in the vault north of the Pumphouse. The bases for TR 3.7.7 indicates that the differential settlement is limited by the expansion joints in the service water lines.

In February 2002, the metal expansion joint on Service Water line 36"-WS-2-151-Q3 was found to be degraded and required replacement. Because there were no replacement expansion joints available, and no assured way to affect a reliable repair, the expansion joint was replaced with a pipe spool piece as an intermediate configuration. A similar metal expansion joint on the adjacent line (36"-WS-1-151-Q3) was also replaced. This intermediate configuration was analyzed and revised allowable settlement limits for the piping monitoring points was implemented as a compensatory measure. The analysis demonstrated acceptability of 1/2-inch differential settlement from the time the piping spool was installed. This amount was added to the cumulative differential displacement measured in the previous survey performed in the Fall 2001 to obtain a revised limit on cumulative differential settlement of 0.145 feet. This more restrictive limit was incorporated into the revision to settlement monitoring procedure 0-

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limits are in effect for the two lines for the period of time the piping spool pieces remain in place.

Technical Requirement 3.7.7 requires a Special Report to be submitted to the NRC if the total settlement or differential settlement of any points exceed 75% of the limits. A similar requirement was imposed upon implementation of the revised limits. Seventy-five percent of the limit on cumulative differential settlement is  $(0.75)(0.145 \text{ ft.})$  or 0.109 feet. This was only 0.014 feet or 0.168 inches greater than the higher cumulative settlement at the time the piping spool pieces were installed (0.095 feet).

The latest survey in accordance with 0-PT-112 found that point SM-18R on one of the Service Water lines was at 76.5% of the revised allowable differential settlement (0.111 feet vs. 0.109 feet) when compared to point SM-7. This is only 0.002 feet or 0.024 inches over the 75% allowable limit.


The differential settlement measured since the intermediate configuration was installed was approximately 0.016 feet (0.192 inches), compared to the additional 1/2-inch differential settlement justified by analysis. Therefore, an additional differential settlement of over 0.3 inches was available before the revised limit on differential settlement is reached.

Further, there was additional margin available beyond the 1/2-inch differential settlement. Additional analysis demonstrated the acceptability of 3/4-inch differential settlement for the intermediate configuration. Therefore, there was 0.558 inches additional differential settlement available before the piping stresses reach the allowables. This was almost three times the amount of differential settlement since the intermediate configuration was installed.

Based on the above, the structural integrity of the safety-related lines was not compromised. The intermediate configuration is no longer applicable since the piping spool pieces in the two lines were replaced with new rubber expansion joints. The allowable displacements of the new rubber expansion joints have been reviewed against the calculated displacements from the applicable piping analyses. Consequently, the current settlement limits given in the Technical Requirements Manual are once again applicable.

This Special Report has been reviewed by the Station Nuclear and Safety Operating Committee. Should you have any questions regarding this report, please contact us at your earliest convenience.

Very truly yours,



D. A. Heacock  
Site Vice President

Commitments made in this letter: None

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