

VIRGINIA ELECTRIC AND POWER COMPANY  
RICHMOND, VIRGINIA 23261

November 7, 2003

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, DC 20555-0001

Serial No. 03-311  
NL&OS/TJS: R5  
Docket Nos.: 50-338/339  
50-280/281  
License Nos.: NPF-4/7  
DPR-32/37

**VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)**  
**NORTH ANNA AND SURRY POWER STATIONS UNITS 1 AND 2**  
**CONTAINMENT HYDROGEN ANALYZER ACCURACY**  
**COMMITMENT CLARIFICATION**

The purpose of this letter is to provide clarification of a commitment pertaining to the containment hydrogen analyzer loop accuracy for both North Anna and Surry Power Stations. Regulatory Guide 1.97, Instrumentation for Light-Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident (Rev. 3), provides guidance regarding instrument range and accuracy requirements. During a recent assessment of Regulatory Guide 1.97 instrumentation, the instrument loop accuracy of the containment hydrogen analyzers was identified as not being consistent with previously docketed statements. Although the instrument loop accuracy is different, the containment hydrogen monitoring systems at both North Anna and Surry Power Stations remain operable and the equipment continues to satisfy the functional requirements of the design basis. A discussion of the commitment clarification is attached.

If you have any questions, please contact Mr. Tom Szymanski at (804) 273-3065.

Very truly yours,



Eugene S. Grecheck  
Vice President – Nuclear Support Services

Attachment

Commitments made by this letter: None

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**ATTACHMENT**

**Containment Hydrogen Analyzer Accuracy  
Commitment Clarification**

**VIRGINIA ELECTRIC AND POWER COMPANY  
NORTH ANNA AND SURRY POWER STATIONS**

## CONTAINMENT HYDROGEN ANALYZER ACCURACY COMMITMENT CHANGE NORTH ANNA (NAPS) AND SURRY (SPS) POWER STATIONS

### Background

On December 21, 1982, and January 11, 1983, the NRC requested NAPS and SPS to supply information to support a post-implementation review of NUREG-0737 Requirements, II.F.1.6, Hydrogen Monitoring System - Accuracy & Placement. Dominion responded in letters Serial Number 727, dated December 21, 1982, and Serial Number 076, dated February 18, 1983, for NAPS and SPS, respectively. The hydrogen analyzer indicator loop accuracy was stated as +/- 2.9% of full scale and the recorder loop accuracy was stated as +/- 2.6% of full scale over a range of 0 - 10% hydrogen concentration for both stations. The NRC referenced these letters in April 21 and 22, 1983 Safety Evaluation Reports (SER) that determined North Anna's and Surry's responses were in compliance with NUREG-0737 Item II.F.1.6; therefore, Dominion is treating these loop accuracy values as commitments to the NRC. Dominion has determined that the originally identified instrument loop accuracy was incorrectly calculated. Subsequent calculations have determined the actual hydrogen analyzer indicator and recorder loop accuracy could be as high as +/- 15% of scale for both NAPS and SPS. These instrument loop accuracy values are applicable in DBA and post-DBA environments.

The containment hydrogen analyzers' loop accuracy was also considered as part of the elimination of post-accident sampling system (PASS) requirements from licensees' Technical Specifications. Specifically, the Technical Specifications requirements for a post-accident sampling system (PASS) were previously deleted from North Anna and Surry Technical Specifications Administrative Controls section using the NRC's consolidated line item improvement process (CLIP). The NRC's safety evaluation report (SER) included in the CLIP for PASS elimination approved Westinghouse Report WCAP-14986-A, Revision 2, "Westinghouse Owners Group, Post Accident Sampling System Requirements: A Technical Basis," which provided the technical basis for PASS elimination. The SER included an implied commitment that licensee's hydrogen analyzers have an accuracy of  $\pm$  one volume percent hydrogen concentration.

Note that the loop accuracy values described herein are expressed as a percent of instrument span, which is not the same as a percent of hydrogen concentration. A +/- 15% of scale loop accuracy equates to a +/- 1.5% hydrogen concentration loop accuracy. This loop accuracy value is applicable to the 0 - 10% hydrogen concentration instrument span only.

## **Discussion**

The hydrogen generation analyses of record for the Design Basis Accident (DBA) are documented in UFSAR Sections 6.2.5.3 and 6.2.3.12 for NAPS and SPS, respectively. The hydrogen recombiners are designed to maintain the hydrogen concentration in containment at 4% or less after a design basis Loss of Coolant Accident (LOCA), consistent with the assumptions outlined in Regulatory Guide 1.7, Revision 2. The hydrogen generation analyses assume that operators place the hydrogen recombiners in service within 24 hours after the onset of a DBA. Applying conservative hydrogen generation rates, initial conditions, and a limiting single failure of one emergency bus de-energized, the analyses conclude that the hydrogen concentration in containment will not exceed the 4% flammability limit with one hydrogen recombiner in operation at 24 hours.

The NAPS and SPS Emergency Operating Procedures (EOPs) were developed in accordance with guidance provided in the Westinghouse Owners Group (WOG) Emergency Response Guidelines (ERGs). The EOPs direct the operator to place the hydrogen recombiner system in service if the measured containment hydrogen concentration is within the range of concentrations for which the recombiners are qualified to safely operate. The EOPs also provide guidance for placing the recombiners in service during post-LOCA cooldown and depressurization. Dominion has determined that, after consideration of the revised calculated hydrogen analyzer loop accuracy values, EOP steps and setpoints continue to ensure that hydrogen recombiners will be placed into service in accordance with the requirements of the DBA. Specifically, the Surry and North Anna DBA analyses result in a containment hydrogen concentration of between 3% and 3.5% at 24 hours after the onset of the DBA. After consideration of the hydrogen analyzer loop accuracy, there is ample margin (both in terms of hydrogen concentration and available operator response time) between the minimum hydrogen concentration EOP setpoint and the hydrogen concentration at 24 hours following the onset of the DBA for operators to identify the containment hydrogen concentration and place the hydrogen recombiners into service. This action ensures that the containment hydrogen concentration will not exceed the 4% flammability limit under DBA conditions.

## **Summary**

Dominion has determined that loop accuracy values for SPS and NAPS hydrogen analyzers may be higher than values previously identified in correspondence to the NRC. Dominion has evaluated this concern and has determined that the design basis function of the hydrogen recombiner system is not compromised by the application of corrected hydrogen concentration analyzer loop accuracy values. Specifically, it is concluded that procedural guidance continues to ensure that the hydrogen recombiners will be placed in service in a proper and timely manner to ensure that the containment hydrogen concentration is maintained below the 4% flammability limit after a DBA. Furthermore, the containment hydrogen analyzer will remain capable of performing its

intended monitoring and trending function of providing post-accident information to the control room operators. Thus, the NAPS and SPS Unit 1 and 2 containment hydrogen analyzers continue to be operable and satisfy the functional requirements of the design basis.

On the basis of the foregoing discussion, Dominion proposes clarification of its previous commitment to specific values of hydrogen concentration analyzer loop accuracy. Dominion reaffirms its commitment to consider the effects of hydrogen concentration analyzer loop accuracy on the ability of operators to place hydrogen recombiners into service in accordance with the requirements of the DBA.