

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

April 18, 1991

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

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Gentlemen:

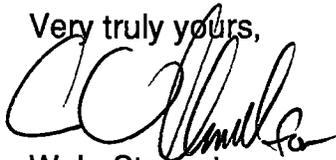
VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNIT 1
FINAL REPORT
ATWS MITIGATION SYSTEM ACTUATION CIRCUITRY

Our letter serial number 91-054, dated February 15, 1991, described the ATWS Mitigation Actuation Circuitry (AMSAC) installation in Surry Unit 1. We reported that the system experienced a number of difficulties shortly after being placed in operation and provided a description of the circumstances. We also stated that we would provide a final report when corrective action had been completed and the system had been returned to service. This final report is attached.

As described in our earlier letter, extensive troubleshooting had been performed in an effort to return the system to service. After correction of the deficiencies described in that report, diagnostic monitoring equipment was installed and the system was placed in service on February 15, 1991. After a period of approximately sixty-eight hours with no adverse performance indications, the system was declared operable on February 18, 1991. Since that time the system has performed satisfactorily, and we consider the system to be fully operable.

Should you have any further questions, please contact us.

Very truly yours,



W. L. Stewart
Senior Vice President - Nuclear

Attachment

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cc: U. S. Nuclear Regulatory Commission
Region II
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Mr. W. E. Holland
NRC Senior Resident Inspector
Surry Power Station

ATTACHMENT
FINAL REPORT
ATWS MITIGATION SYSTEM ACTUATION CIRCUITRY
(AMSAC)

The Anticipated Transient Without Scram (ATWS) Mitigation System Actuation Circuitry was installed in Surry Unit 1 during the Fall 1990 refueling outage. In early December of 1990, engineering and testing personnel performed field verification testing as specified by the design document and also satisfactorily performed calibration and functional testing. Based on the results of this testing, the system was determined to be fully operable. On December 20, 1990, shortly after placing the system in service, we began to receive spurious alarms, and the system was placed in "Bypass" for troubleshooting.

On December 21, 1990, a problem was found and corrected in one of the analog input modules. The system was tested using the monthly performance test, and on December 22, 1990, it was placed back in "Normal." From December 22 through 28, a number of spurious "Trouble" alarms were received, and on December 28, 1990, the system was returned to "Bypass" for further troubleshooting.

On December 31, 1990, a problem was found with improper voltage ratings of the output relay modules interfacing with the Main Control Room annunciator circuits. Specifically, 125 volts DC was being applied to relay output module boards which were rated for only 30 volts DC. A Field Change to the original design was installed to correct this condition.

When the system was tested on January 12, 1991, following the Field Change, another problem was discovered. When the panel door was being closed, the door switch was initiating an unexpected "Armed" alarm, and troubleshooting was resumed using diagnostic software. Some components were found suspect and replaced, and the system was recalibrated and field verified. After a satisfactory technical review by engineering and the Station Nuclear Safety and Operating Committee on January 23, 1991, the system was returned to "Normal." Eighteen hours later, on January 24, 1991, spurious alarms were received again and the system was returned to "Bypass." The diagnostic software was reinstalled, and a defective input module was found in one of the programmable logic controllers. This module was replaced and the system was monitored using the diagnostic software for several days. No further problems were encountered and the system was returned to service on February 4, 1991, after recalibration and field verification. Later that day, spurious alarms began to recur, including problems originating with the door switch, and the system was placed in "Bypass" for further troubleshooting.

On February 6, 1991, troubleshooting located a short between two field wiring contacts on one of the system power supply status relays. This flaw was a result of inadequate clearance between adjacent terminations on a relay in the system's 24VDC power supply modules. Three 24VDC power supplies are used in the AMSAC panel to power analog inputs to the system. The relay provides an alarm when the power supply fails. Inadequate clearance between adjacent terminations

on this relay allowed 125VDC from the annunciator circuit to be intermittently applied to the 24VDC analog input circuits. This voltage fluctuation made it appear that the analog input modules were malfunctioning, causing much of the troubleshooting effort to be directed toward the behavior of the power supplies and the analog input modules. The problem was corrected by using different relay terminals for the 125VDC connections.

On February 15, 1991, the system was returned to service with the diagnostic monitoring equipment installed. After a period of approximately sixty-eight hours with no adverse symptoms noted, the system was declared operable on February 18, 1991. Since that time, the system has performed satisfactorily and is considered to be fully operable.

The AMSAC is redundant to the Reactor Protection System and is designed to trip the main turbine, initiate auxiliary feedwater flow, and trip the output breakers of the Rod Drive Motor Generator sets in the event the Reactor Protection System (RPS) fails to function. The RPS has been fully operable since the unit was returned to service. Therefore, the health and safety of the public were unaffected. Also, the Emergency Operating Procedures provide detailed manual actions to be taken by operations personnel in the event the RPS does not function when required. These manual actions include those performed automatically by AMSAC.