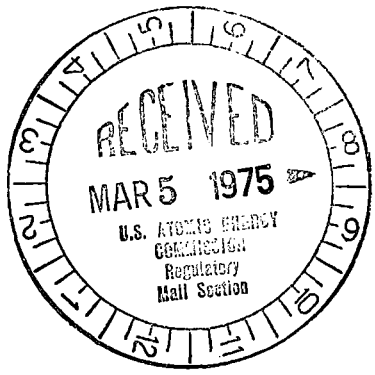
VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

February 24, 1975



Regulatory File Cy.

Mr. Norman C. Moseley, Director
Directorate of Regulatory Operations
United States Nuclear Regulatory Commission
Region II - Suite 818
230 Peachtree Street, Northwest
Atlanta, Georgia 30303

Serial No. 436
PO&M/JTB:clw

Docket Nos. 50-280
License Nos. DPR-32

Dear Mr. Moseley:

Pursuant to Surry Power Station Technical Specification 6.6.B.1, the Virginia Electric and Power Company hereby submits forty (40) copies of Abnormal Occurrence Report No. AO-S1-75-01.

The substance of this report has been reviewed by the Station Nuclear Safety and Operating Committee and will be placed on the agenda for the next meeting of the System Nuclear Safety and Operating Committee.

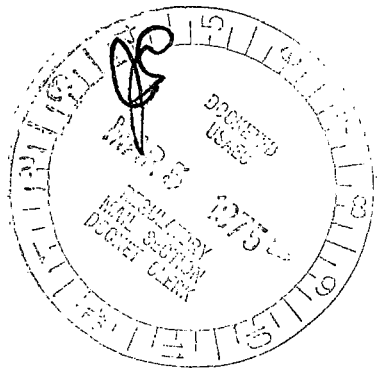
Very truly yours,

C. M. Stallings

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

Enclosures
40 copies of AO-S1-75-01

cc: Mr. K. R. Goller



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ABNORMAL OCCURRENCE REPORT

REPORT NO. AO-S1-75-01

DILUTION OF THE PRIMARY SYSTEM BORON CONCENTRATION

JANUARY 18, 1975

DOCKET NO. 50-280
LICENSE NO. DPR-32

SURRY POWER STATION

VIRGINIA ELECTRIC AND POWER COMPANY

I. INTRODUCTION

In accordance with Technical Specification 6.6.B.1 for Surry Power Station, Operating License Number DPR-32, this report describes an abnormal occurrence which was identified on January 18, 1975. The Directorate of Regulatory Operations, Region II, was notified on January 18, 1975.

The occurrence reported herein is classified as an abnormal occurrence pursuant to Technical Specification 1.0.I.2 which states that "An abnormal occurrence is defined as: Any unit condition that results in violation of a limiting condition for operation as established in these Technical Specifications." TS 3.8.A.5 states "Positive reactivity changes shall not be made by rod drive motion or boron dilution unless the containment integrity is intact."

The occurrence described herein resulted in a reactivity increase without containment integrity having been established.

II. SUMMARY OF OCCURRENCE

On January 18, 1975, Unit No. 1 was in a cold shutdown condition for a refueling outage. Preparations were being made to start-up Unit No. 1, but containment integrity had not yet been established. Prior to establishing integrity, the boron concentration of the primary coolant was observed to be 1842 ppm. Primary grade water (PG) flow controller 1114A was found to be in the manual mode of operation, with a demand position corresponding to full open position of valve FCV-1114A.

The flow controller was returned to the automatic mode and the primary system was borated to 2090 ppm.

III. ANALYSIS OF OCCURRENCE

Flow controller FC-1114A controls PG valve FCV-1114A in the chemical volume control system (CVCS). In the automatic mode of operation the flow of primary grade water to the blender is adjusted to a set value determined by operator adjustment of HFC-114. When the mode switch of the CVCS is in auto, the level of the volume control tank (VCT) is maintained (at 35 per cent) by a "start" signal to the FC-1114A (PG water) and FC-1113A (Boric Acid) controllers which cause the valves FCV-1113A and FCV-1114A to open to preset demand positions. Valve FCV-1114A (initially fully closed) modulates open to the required position while valve 1113A, (initially open) modulates closed.

In the manual mode of operation of FC-1114A the demand position of the controller is manually adjustable and does not seek the set position. Upon loss of power to FC-1114A the controller reverts to the manual mode of operation, with whatever demand position existed at the time of the loss of power.

On January 14, 1975, a periodic test was performed (PT 22.1) which resulted in a temporary loss of power to vital bus III which supplies controller FC-1114A. It is postulated that the demand position of FC-1114A at this time was "full open" such that this incident left the FC-1114A in the manual, full open condition.

FC-1114A has lights which indicate the status of the controller. The "manual" mode indicating lights were found on January 21, 1975, to be burned out, and therefore did not serve on January 14, 1975 to alert the operator to the fact that the controller was in the manual mode of control.

In the period of time between January 14 and January 18, 1975, the VCT level control was in AUTO, such that, on occasion, "start" signals were

sent to FC-1114A which then opened valve FC-1114A fully. During the time this primary system make-up flow existed, the primary grade water flow was greater than the flow rate which corresponded to a blend with the boric acid flow to yield primary coolant at 2000 ppm (resulting from power loss to vital Instrument Bus III). The blender flow had a minimum boron content of 1312 ppm. This source of dilution occurred intermittently until the overall primary coolant dilution of 1842 ppm was discovered by routine chemistry sampling.

This minor dilution of the primary system was not discovered by its effect on the source range detectors due to the large magnitude of the shutdown margin. Had the dilution continued indefinitely, the reactor coolant boron concentration would have leveled off at 1312 ppm. This concentration would have maintained the required shutdown margin.

IV. CORRECTIVE ACTION TO PREVENT RECURRENCE

The burned out light bulbs which were the contributing electrical failure have been replaced. The operators were re-instructed to scrutinize all indicating lights periodically to detect system malfunctions. All operations personnel were instructed to maintain the boron concentration during shutdown periods to ensure integrity is set prior to commencing dilutions. Also, an investigation is being made to determine if circuit changes can be made to the controller (FC-1114A) to fail the PG valve closed on loss of power to the controller.

V. ANALYSIS AND EVALUATION OF SAFETY IMPLICATIONS OF THE OCCURRENCE

The shutdown margin is defined by TS 3.12.A.3.c as "the amount by which the reactor core would be subcritical at hot shutdown conditions (T_{avg} = 547^{o}F)

if all control rod assemblies were tripped, assuming that the highest worth control rod assembly remained fully withdrawn, and assuming no changes in xenon, boron, or part-length rod position."

The shutdown margin decreased about 2 per cent ΔK/K to a minimum of 11 per cent ΔK/K during this occurrence. The shutdown margin could have declined to a minimum of 8.4 per cent had the dilution continued indefinitely. (The TS limit on the shutdown margin is 1.00 per cent). This analysis does not take credit for P/L rods (which were inserted). The fact that the reactor was in the cold condition is an additional shutdown margin benefit since the temperature coefficient is positive in this range of boron concentration and temperature.

The importance of the shutdown margin under the conditions of cold shutdown is the need to avoid a return to criticality during a rod ejection accident.

VI. CONCLUSIONS

The licensee concludes that:

1. FCV-1114A modulated full open during auto make-up mode and maintained same as result of loss of process power to Vital Instrument Bus III during PT 22.1.
2. The shutdown margin declined, but remained considerably greater than the required limit, during this occurrence. It would have remained so even with a dilution of indefinite duration.

3. The occurrence described herein did not affect the safe operation of the station.

4. The occurrence described herein did not adversely affect the health or safety of the general public.