VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

W. R. CARTWRIGHT
VICE PRESIDENT
NUCLEAR

January 9, 1989

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

Serial No. 88-834
NO/ETS:vlh
Docket Nos. 50-280
50-281
License Nos. DPR-32
DPR-37

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
SURRY POWER STATION UNITS 1 AND 2
REVISION TO I.E. BULLETIN 84-03 RESPONSE
REFUELING CAVITY WATER SEAL

On May 17, 1988, Surry Unit 1 experienced a partial loss of refueling cavity water level. The cause of the loss was initially attributed to isolation of air to the inflatable seal of the Reactor Cavity Seal Assembly (RCSA). Further investigation revealed that the passive component of the seal assembly did not perform as designed to prevent excessive leakage. This event was documented in LER 88-30 and discussed with your staff in Atlanta on September 16, 1988.

Prior to use during the current Unit 1 and Unit 2 outages the individual seals, the seal assembly and the seating surfaces were inspected. The seals were replaced, and the maintenance procedure for inspecting and installing the assembly was revised. Enhancements were made to the seal assembly and the seating area to accommodate surface irregularities. Changes were made to prevent deflection of the seating area under hydrostatic load and to ensure the seals ability to withstand a dynamic impact. Plant normal and abnormal operating procedures were reviewed and revised as necessary to provide guidance should a loss of reactor cavity level occur. A means to remotely monitor refueling cavity level was also instituted.

Following installation, the passive component of the seal assembly was tested with refueling cavity water levels of approximately 18 inches, 16 feet and 27 feet. This functional test demonstrated the leak limiting capability of the installed passive component upon failure of the inflatable seal. The leak rates identified were 0.3 gpm and 0.07 gpm for Unit 1 and 2 respectively.

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As we committed, this letter provides in the attachment the Company's revised response to I. E. Bulletin 84-03, "Refueling Cavity Water Seal," dated October 9, 1984, Serial No. 591.

The information provided in this revised response is true and accurate to the best of my knowledge. Should you have any questions or concerns regarding this submittal, please call.

Very truly yours,

W. R. Cartwright

Attachment

cc: U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, N. W.
Suite 2900
Atlanta, Georgia 30323

Mr. W. E. Holland
NRC Senior Resident Inspector
Surry Power Station

Mr. B. C. Buckley
NRC Surry Project Manager
Project Directorate II-2
Division of Reactor Projects - I/II

COMMONWEALTH OF VIRGINIA)
)
COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by W. R. Cartwright who is 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 9TH day of January, 19 89.

My Commission expires: February 25, 19 90.

Vicki L. Hull
Notary Public

(SEAL)

SURRY POWER STATION
REVISED RESPONSE TO IEB 84-03
REFUELING CAVITY WATER SEAL

The reactor cavity seal for both Surry units consists of a diaphragm plate permanently bolted to the reactor cavity liner and a removable seal ring assembly installed in the annular space between the reactor vessel flange and the diaphragm plate. The removable seal ring assembly, used during refuelings, consists of a passive compression seal (J-Seal) and a pressurized inflatable seal. Compressive forces from both the deadweight of the assembly and the weight of the refueling water seat the J-Seal. The pressurized seal uses inflatable gaskets to provide a seal between the reactor vessel flange and the diaphragm plate. A regulated air supply is used to inflate this seal, bottled nitrogen is provided as a back-up source of air.

A catastrophic failure of the seal assembly is not a credible event since physical size prevents the ring from passing through the annular opening. Should the inflatable seal depressurize, the passive J-Seal feature will limit leakage to acceptable limits allowing sufficient time for compensatory operator action.

An acceptable leak rate of 150 gpm was established for the passive J-Seal. This rate provides over three hours before the refueling cavity water level would drop from the administratively controlled minimum level above the reactor vessel flange maintained during refueling of 26'-6", to the Technical Specification level of 23' (i.e., the level used in fuel handling accident safety analysis). This duration conservatively assumes the spent fuel pool is isolated and does not contribute inventory to slow the reactor cavity level drop. Three hours provides ample time for operator action to suspend refueling operations and restore refueling cavity level without fuel damage or significant exposures to refueling operators. In each case, operator actions are guided by station abnormal procedures.

Assuming a 150 gpm leakage rate and the refueling cavity in direct communication with the spent fuel pool, the water level would decrease to approximately 13 inches above the spent fuel (approximately 62 hours) and to the reactor vessel flange in the cavity (approximately 65 hours). The Residual Heat Removal System would continue to cool the core; however, operator action is necessary to provide makeup for cooling of the spent fuel pool. Procedures require that during refueling operations one Low Head Safety Injection pump be available to provide an emergency source of makeup to the refueling cavity at a design flow rate of 3250 gpm.

Conclusion

With the modifications to the reactor cavity seal and the rigorous inspection and testing program established to verify proper seal operation, the potential for excessive seal leakage is virtually eliminated. Additionally, enhancements have been made to the station abnormal procedure to ensure prompt operator action on loss of refueling cavity or spent fuel pool level.