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November 28, 1984

United States Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, PA 19406

ATTENTION: Dr. Thomas E. Murley
Administrator

SUBJECT: Beaver Valley Power Station - Unit No. 2
Docket No. 50-412
Response to IE Bulletin 84-03

Gentlemen:

This letter is forwarded in response to IE Bulletin 84-03, "Refueling Cavity Water Seal," dated August 24, 1984. IE Bulletin 84-03 directed that CP holders provide an evaluation within 90 days of receipt of the bulletin.

The refueling cavity seal design for Beaver Valley Power Station Unit 2 (BVPS-2) does not use inflatible seals, as did Haddam Neck. The design of the BVPS-2 refueling cavity seal makes a gross failure extremely improbable.

The BVPS-2 abnormal refueling procedures, as noted in the attached report, will be developed by July 1985. The information provided by IE Bulletin 84-03, the BVPS-1 abnormal refueling procedures, and the attached report will be evaluated in the development of the BVPS-2 abnormal refueling procedures. These procedures, upon completion and approval, will be made available, upon request, to either Region I or to the NRC Resident Inspector.

DUQUESNE LIGHT COMPANY

By E. J. Woolever
E. J. Woolever
Vice President

RW/wjs
Attachment

cc: Mr. B. K. Singh, Project Manager (w/a)
Mr. G. Walton, NRC Resident Inspector (w/a)

SUBSCRIBED AND SWORN TO BEFORE ME THIS
28th DAY OF November, 1984.

Anita Elaine Reiter
Notary Public

1/1

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF ALLEGHENY)

On this 28th day of November, 1984, before me, a Notary Public in and for said Commonwealth and County, personally appeared E. J. Woolever, who being duly sworn, deposed and said that (1) he is Vice President of Duquesne Light, (2) he is duly authorized to execute and file the foregoing Submittal on behalf of said Company, and (3) the statements set forth in the Submittal are true and correct to the best of his knowledge.

Anita Elaine Reiter
Notary Public

ANITA ELAINE REITER, NOTARY PUBLIC
ROBINSON TOWNSHIP, ALLEGHENY COUNTY
MY COMMISSION EXPIRES OCTOBER 20, 1986

ATTACHMENT

Action to be taken by plants prior to beginning refueling or within 90 days of receipt of this bulletin, whichever is sooner:

Evaluate the potential for and consequences of a refueling cavity water seal failure and provide a summary report of these actions.

Such evaluations should include consideration of gross seal failure, maximum leak rate due to failure of active components such as inflated seals, makeup capacity, time to cladding damage without operator action, potential effect on stored fuel and fuel in transfer and emergency operating procedures.

Response:

Seal Description:

The BVPS-2 refueling cavity water seal uses no inflatible seals. The seal is a stainless steel ring which spans the annular gap between the reactor vessel flange and the neutron shield wall/refueling cavity floor. Double gaskets provide sealing near the inner and outer circumferences of the ring. These four trapezoidal cross section gaskets are retained in two grooves in the seal ring by segmented steel retainers which are screwed into the ring. Alignment pins ensure proper positioning of the ring. Bolts around the outer circumference directly compress two outer gaskets, and, through tensioning arms, compress the two inner circumference gaskets. As the reactor cavity is filled, the column of water above the seal ring provides additional force to ensure a tight sealing by the gaskets.

Gross Seal Failure

The seal design, with retained trapezoidal gaskets, and the downward forces on the gasket ensure that the much smaller forces pushing the gaskets toward the gap will not push the gaskets into the gap. The neoprene gasket material has no compressive failure modes. Therefore, it is considered highly improbable that any failure of the BVPS-2 reactor cavity water seal could result in a gross leak similar to that described in IE Bulletin 84-03.

Maximum Leak Rate due to Failure of Active Components such as Inflated Seals

The BVPS-2 refueling cavity seal has no active components such as inflated seals that may fail.

Makeup Capacity

Several methods are available to provide makeup far in excess of any credible leakage of the BVPS-2 seal design.

a) Charging/High Head Safety Injection Pumps - 550 gpm (runout)
b) RWST Recirculation Pumps - 375 gpm (nominal)
c) Low Head Safety Injection Pumps - 3000 to 5000 gpm (nominal and runout flows, respectively)

Time to Cladding Damage without Operator Action

Hand calculations were performed to determine the time to cladding melt based on the following assumptions:

a) Fuel assembly is suspended in containment air
b) Containment air temperature 105°
c) Initial temperature of fuel pool 140°
d) Decay heat load of 127.52 x 10^6 btu/hr at 150 hrs after shutdown

The results of the hand calculations indicate a minimum of 60 minutes elapse before melting occurs with the assembly out of water.

Potential Effect on Stored Fuel

In the event of reactor cavity seal failure, loss of water through the transfer tube would lower water levels in the spent fuel pool to elevation 742'1". The stored spent fuel assemblies would remain covered by approximately 9 inches of water. It has been calculated that it would take several hours for the water above the spent fuel to evaporate. This calculation assumed that the postulated accident occurs after cycle 12 with an initial pool temperature of 140° and that no makeup water was added.

Before the water remaining above the stored fuel could evaporate completely, makeup water could be provided from the Refueling Water Storage Tank Recirculation Pumps, Primary Grade Water Pumps (no boron), or in extreme emergencies with the River Water or Fire Protection Systems' Pumps. Design of the fuel racks would prevent criticality in the spent fuel pool under all conditions. In addition, the ventilation drains from the cooling unit return to the spent fuel pool. Makeup to the RWST is available through the CVCS System with 2000 ppm of borated water.

Potential Effect on Fuel in Transfer

Fuel in the transfer tube or the spent fuel pool or fuel positioned horizontally in an upender would remain covered even in the event of a total failure of the cavity water seal. The elevations would allow partial uncovering of the fuel if positioned in the Rod Control Cluster Change Fixture or vertically in the upender; however, this is not a credible event with the BVPS-2 water seal design.

Emergency Operating Procedures

As a result of this IE Bulletin, Abnormal Operating/Refueling Procedures will be developed to address decreasing refueling cavity water level and decreasing spent fuel pool water level. These procedures will be developed and approved by July 1985.