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October 24, 1996

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

Subject: Beaver Valley Power Station, Unit No. 1 and No. 2
BV-1 Docket No. 50-334, License No. DPR-66
BV-2 Docket No. 50-412, License No. NPF-73
NRC Generic Letter No. 96-04

Duquesne Light Company (DLC) is responsible for the operation of Beaver Valley Power Station (BVPS) Units No. 1 and No. 2. Attachment 1 provides the DLC response to NRC Generic Letter No. 96-04, "Boraflex Degradation in Spent Fuel Pool Storage Racks," and Table 1 provides chronological trends of BVPS Unit 2 Spent Fuel Pool reactive silica levels along with the timing of recent refueling events.

If you have any questions on this response, please contact Mr. Roy K. Brosi, Manager, Nuclear Safety Department, at (412) 393-5210.

Sincerely,

Sushil C. Jain

c: Mr. D. M. Kern, Sr. Resident Inspector
Mr. H. J. Miller, NRC Region I Administrator
Mr. D. S. Brinkman, Sr. Project Manager

A068 1/1

DELIVERING QUALITY ENERGY

AFFIDAVIT FOR APPLICATION

OF AMENDMENT

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF BEAVER)

Subject: Beaver Valley Power Station, Unit No. 1 and No. 2
BV-1 Docket No. 50-334, License No. DPR-66
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NRC Generic Letter No. 96-04

Before me, the undersigned notary public, in and for the County and Commonwealth aforesaid, this day personally appeared Sushil C. Jain, to me known, who being duly sworn according to law, deposes and says that he is Division Vice President, Nuclear Services of the Nuclear Power Division, Duquesne Light Company, he is duly authorized to execute and file the foregoing submittal on behalf of said Company, and the statements set forth in the submittal are true and correct to the best of his knowledge, information and belief.

Sushil C. Jain

Subscribed and sworn to before me

on this 24th day of October, 1996

Tracey A. Baczek
Notary Public

Notarial Seal
Tracey A. Baczek, Notary Public
Shippingport Boro, Beaver County
My Commission Expires Aug. 16, 1997
Member, Pennsylvania Association of Notaries

ATTACHMENT 1

Beaver Valley Power Station Unit 1 & 2 Response to NRC GENERIC LETTER 96-04: Boraflex Degradation in Spent Fuel Pool Storage Racks

1. Description of the Spent Fuel Storage Racks at Beaver Valley Units 1 and 2:

Beaver Valley Unit 1 uses Boral as the neutron absorber in its spent fuel storage racks. Boral is composed of boron carbide uniformly distributed in Type 1100 aluminum powder and clad with Type 1100 aluminum. Since the Beaver Valley Unit 1 spent fuel storage racks do not contain Boraflex, Generic Letter 96-04 is not applicable to Unit 1.

Beaver Valley Unit 2 uses Boraflex as the neutron absorber in its spent fuel storage racks. These spent fuel storage racks were manufactured by Nuclear Energy Services, Inc. (NES). The Boraflex is in the form of panels which are 145 inches long, 7.5 inches wide and 68 mils thick. The panels are mounted vertically on each side of the spent fuel storage cells. Boraflex panels are not used on the outer perimeter of the spent fuel storage cells which face the fuel pool walls. A cover plate of 29 mil thick stainless steel is fillet welded every 6 inches to the cell and is used to encapsulate the Boraflex panel flush between the cell wall and cover plate. A 78 mil thick stainless steel stop plate is attached to each end of the cell. The encapsulation of these panels minimizes the ingress of pool water to the Boraflex.

2. Boraflex Monitoring Programs:

Duquesne Light has developed a Boraflex surveillance program to monitor the condition of the Boraflex located in the Beaver Valley Unit 2 spent fuel pool storage racks. Engineering Standard, ES-M-008, "Neutron Absorber Surveillance Program Plan for the Beaver Valley Power Station Unit # 2 High Density Spent Fuel Storage Racks," was developed to periodically inspect Boraflex sample coupons in order to detect any unanticipated changes before such changes progress to the point where they can adversely affect the nuclear characteristics of the Unit 2 spent fuel storage racks. The Beaver Valley Unit 2 program includes accelerated and long term surveillance assemblies each containing sixteen (16) packets of two (2) Boraflex coupons.

The accelerated surveillance assembly was initially placed into the spent fuel pool and surrounded by freshly discharged fuel. During each refueling outage, this surveillance assembly is relocated to a new storage location and surrounded by freshly discharged fuel. This provides Boraflex material behavior data for a given exposure well in advance of the time at which the Boraflex material in the fuel racks reaches the same exposure. It is estimated that the accelerated sample exposure level will be at least twice that of the Boraflex material in the spent fuel storage racks. Coupons from the accelerated surveillance assembly are removed and analyzed every 2 years.

The long-term surveillance assembly was initially placed in a permanent location within the spent fuel pool and surrounded by freshly discharged fuel. This assembly will remain in the same pool location with no movement of nearby fuel for the duration of the long-term surveillance program. This effectively models the exposure history that the Boraflex material in the spent fuel storage

racks will experience during its lifetime. Coupons from the long-term surveillance assembly are removed and analyzed every 4 years.

The Duquesne Light Company is also the host utility for the EPRI Boraflex Surveillance Program. As part of this joint EPRI/Duquesne Light research effort, the EPRI surveillance assembly has been inserted into the Beaver Valley Unit 2 spent fuel pool. This EPRI surveillance assembly not only consists of a series of large coupons which are removed for analysis, but also includes three (3) full length panels which are inspected at approximately 2 year intervals. During each refueling outage, the EPRI surveillance assembly is also relocated to a new storage location and surrounded by freshly discharged fuel in a manner similar to that of the Beaver Valley accelerated surveillance assembly described previously.

3. Assessment of the physical condition of the Boraflex, including any deterioration, on the basis of current accumulated gamma exposure and possible water ingress to the Boraflex and assurance of a subcritical margin of 5 percent for the racks in unborated water:

To date, four (4) inspections of the EPRI surveillance assembly have been performed, the latest of which occurred on August 22, 1995. A coupon was removed from the EPRI surveillance assembly and sent to the Pennsylvania State University for analysis. The analysis results contained in the Northeast Technology Corporation (NETCo) Inspection Report 043-04-95 have concluded that the coupon exhibited shrinkage and thinning by 3% on the average, the neutron attenuation increased slightly due to an increase in the density of Boraflex from cross linking, and the hardness of the coupon increased by 27%, all as expected. Overall, the coupon was found to be intact and capable of performing its neutron absorption function. The inspection of the three full length panels was of major interest. Preliminary findings from this recent inspection found that the full length panels were all intact with no separations or gaps evident. Although the panels are intact, some thinning has taken place along the edges between the points where the cover plate is attached to the cell. Because the EPRI surveillance assembly is receiving exposure at an accelerated rate, these panels provide a conservative representation of the condition of the Boraflex panels located throughout the pool. To date, inspections have shown that the panels and coupons are intact and still retain the Boron Carbide neutron absorber. The next inspection of the EPRI surveillance assembly is scheduled to be performed in the fall of 1997.

Previous inspections performed on coupons taken from the Beaver Valley accelerated and long-term surveillance assemblies have also reported the coupons to be in good condition with no evidence of thinning. The analysis results, contained in NETCo report NET-107-01, on the coupons retrieved from the accelerated surveillance assembly in August of 1995 exhibited no degradation or changes (other than those normally expected when Boraflex is exposed to gamma radiation in the spent fuel pool environment) which would indicate any significant loss in boron carbide or integrity of the polymer matrix. However, the region of the Boraflex coupon positioned beneath the inspection port in the sample holder has dissolved leaving a hole in the Boraflex coupon. The dissolution was observed to be locally restricted to the Boraflex directly beneath the inspection ports. Since the Beaver Valley Unit 2 NES spent fuel storage racks also

contain similar 3/8 inch inspection ports located approximately 4 inches from the top of each cell, similar effects on the Boraflex at this location would be expected. This dissolution has been evaluated to have an insignificant effect on the reactivity state of the racks based on an independent evaluation conducted by Northeast Technology Corporation and documented in Inspection Report NET-107-01.

Based on the condition of the sample coupons and full length panels which are located in the surveillance assemblies as discussed above, Duquesne Light considers the Boraflex panels in the spent fuel storage racks at Beaver Valley Unit 2 to be in good condition and that a subcritical margin of 5 percent can be maintained for the racks in unborated water.

4. Description of any proposed actions to monitor or confirm that this 5-percent subcriticality margin can be maintained:

Beaver Valley is maintaining its coupon surveillance program in order to provide an early indication of Boraflex degradation which could reduce the required 5-percent subcriticality margin. The current and future physical condition of the Boraflex panels can also be assessed using the newly developed "RACKLIFE" software which is available from EPRI. This software is being considered for use at Beaver Valley Unit 2 to analyze the behavior of the Boraflex neutron absorbing panels used in the spent fuel storage racks.

5. Describe the results from any previous post operational blackness tests and state whether blackness testing, or other in-situ tests or measurements, will be periodically performed:

Blackness testing has not been performed at Beaver Valley Unit 2 due to the existence of the EPRI full length panels and the capability to periodically inspect those panels for degradation. By utilizing inspection results from the EPRI surveillance assembly full length panels located in the Unit 2 pool, as well as the Boraflex coupons in all the surveillance assemblies, the integrity of the Boraflex panels in the pool can be conservatively determined.

6. Provide chronological trends of pool reactive silica levels, along with the timing of significant events such as refuelings, pool silica cleanups, etc.:

Historical silica data for BVPS Unit 2 is provided in the attached Table 1. Refueling outages have been identified in the table. Pool silica cleanups have not been performed at Beaver Valley Unit 2.

7. Describe the implications of how these pool silica levels relate to Boraflex performance:

Beaver Valley Unit 2 spent fuel pool silica levels have been monitored since December 1991 in order to ensure that accelerated dissolution of Boraflex is not occurring. The gradual increase in silica levels indicate some limited Boraflex dissolution. No significant increases in silica levels

have been observed which would indicate advanced deterioration of the Boraflex based on the Boraflex Working Group data and research.

8. Describe what corrective actions could be taken in the event that the 5-percent subcriticality margin cannot be maintained:

Duquesne Light Company is an active participant in the EPRI Boraflex working group, which routinely discusses issues of monitoring, mitigation, and resolution of Boraflex degradation. As a result of this participation, Duquesne Light has the opportunity to monitor the experiences of other utilities with similar rack designs which contain Boraflex as the neutron absorber. Duquesne Light is aware that the NRC is presently evaluating a proposed methodology that was submitted by another utility to take credit for soluble boron in PWR pool water. Upon NRC approval of the submittal for soluble boron credit, Duquesne Light will consider submitting a similar proposal.

In the event current surveillance activities identify degradation that would indicate a significant loss in boron carbide or integrity of the polymer matrix, Duquesne Light will take appropriate actions to address this condition based on acceptable methodologies. The use of an acceptable methodology to address the identified degradation may include the performance of quantitative in-situ measurements of the boron-10 areal density of the Boraflex in the spent fuel storage racks. This could be performed using a Boron-10 Areal Density Gage for Evaluating Racks (BADGER) developed by EPRI. This inspection tool will determine the areal density of the Boraflex, the location of density changes and whether the panel is intact. This tool has been developed and tested for BWR type pools. A BADGER inspection tool for PWR type fuel pool racks is currently under development with testing of the tool planned for early 1997.

Based on retrieved data, burnup credits may be utilized to partially offset the effects of the Boraflex degradation. Also, administrative controls in the form of checkerboard loading configurations in conjunction with poison inserts may be utilized in the event the BADGER testing identifies areas of excessive degradation in the Unit 2 spent fuel pool. In the event BADGER testing does not identify areas of degradation concern, continued periodic monitoring and surveillance of the Boraflex will be performed, as necessary.

Beaver Valley Power Station Unit 1 & 2 Response to
NRC GENERIC LETTER 96-04:
Boraflex Degradation in Spent Fuel Pool Storage Racks

TABLE 1

BVPS UNIT 2

Historical Silica Data :

DATE	FUEL POOL SiO_2 (ppm)	SIGNIFICANT EVENTS
Dec 1991	3.8	
Jan 1992	3.3	
Feb 1992	3.6	
Mar 1992	3.7	Begin 3rd Refueling Outage
Apr 1992	3.1	
May 1992	3.1	End 3rd Refueling Outage
Jun 1992	3.4	
Jul 1992	3.6	
Aug 1992	3.7	
Sep 1992	4.1	
Oct 1992	3.9	
Nov 1992	3.9	
Dec 1992	2.8	
Jan 1993	4.2	
Feb 1993	4.3	
Mar 1993	4.4	
Apr 1993	4.2	
May 1993	4.4	
Jun 1993	4.7	
Jul 1993	4.9	
Aug 1993	5.0	
Sep 1993	5.0	Begin 4th Refueling Outage
Oct 1993	4.9	
Nov 1993	4.8	
Dec 1993	4.5	End 4th Refueling Outage
Jan 1994	5.1	
Feb 1994	4.7	
Mar 1994	4.7	
Apr 1994	5.2	

DATE	FUEL POOL SiO_2 (ppm)	SIGNIFICANT EVENTS
May 1994	4.6	
Jun 1994	6.1	
Jul 1994	6.2	
Aug 1994	6.4	
Sep 1994	5.3	
Oct 1994	6.1	
Nov 1994	7.2	
Dec 1994	6.9	
Jan 1995	6.3	
Feb 1995	6.5	
Mar 1995	6.7	Begin 5th Refueling Outage
Apr 1995	5.9	
May 1995	5.08	End 5th Refueling Outage
Jun 1995	5.16	
Jul 1995	5.02	
Aug 1995	5.56	
Sep 1995	5.94	
Oct 1995	5.86	
Nov 1995	6.08	
Dec 1995	6.32	
Jan 1996	7.00	
Feb 1996	5.80	
Mar 1996	6.36	
Apr 1996	6.26	
May 1996	6.62	
Jun 1996	6.70	
Jul 1996	5.60	
Aug 1996	6.70	Begin 6th Refueling Outage
Sep 1996	6.80	
Oct 1996	6.08	