



Duquesne Light

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October 8, 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
Auxiliary Feedwater Pump Impeller Wear Ring
Reportable Significant Deficiency Report 84-09

Gentlemen:

This final report is in reference to the Reportable Significant Deficiency relating to the auxiliary feedwater pump impeller wear ring problem. Pursuant to the requirements of 10CFR50.55(e), it is anticipated that this is a final report and no further reports are anticipated.

DUQUESNE LIGHT COMPANY

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

SDH/wjs
Attachment

cc: Mr. R. DeYoung, Director (3) (w/a)
Mr. R. Cortland (w/a)
Ms. M. Ley, Project Manager (w/a)
Mr. E. A. Licitra, Project Manager (w/a)
Mr. G. Walton, NRC Resident Inspector (w/a)
INPO Records Center (w/a)
NRC Document Control Desk (w/a)

COPY

SUBSCRIBED AND SWORN TO BEFORE ME THIS
5th DAY OF October, 1984.

Leo J. L...
Notary Public

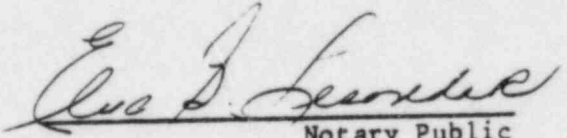
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LEO J. L... NOTARY PUBLIC
... COUNTY
... OCTOBER 20, 1986

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COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF ALLEGHENY)

On this 5th day of October, 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.


Notary Public

ELVA G. LESONDAK, NOTARY PUBLIC
ROBINSON TOWNSHIP, ALLEGHENY COUNTY
MY COMMISSION EXPIRES OCTOBER 20, 1986

SDH/wjs
NR/NRC/SDR8409
Attachment

bcc: J. J. Carey (w/attachment)
J. A. Hultz "
C. E. Ewing "
T. D. Jones "
T. P. Noonan "
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P. RaySircar (S&W) "
D. Chamberlain (S&W) "
T. J. Lex (4) "
S. Phillips (W) "
NCD File "
SDR 84-07 File "

References: (1) 2DLC-6952, dated 3/20/84
(2) 2DLC-7411, dated 8/15/84
(3) 2DLS-22895, dated 10/1/84

BEAVER VALLEY POWER STATION - UNIT NO. 2
DUQUESNE LIGHT COMPANY

Reportable Significant Deficiency Report 84-09
Auxiliary Feedwater Pump Impeller Wear Ring

1. SUMMARY

Duquesne Light Company (DLC) was advised by Bingham-Willamette (B-W) Company that an auxiliary feedwater pump at the Palo Verde Nuclear Generating Station had experienced the failure of an impeller wear ring. B-W stated that the BVPS-2 auxiliary feedwater pumps (2FWE*P22-turbine driven; 2FWE*P23A and B-motor driven) have a wear ring design and wear ring material (AISI 440A spuncast) identical to the Palo Verde pumps. The Palo Verde incident was reported to the NRC under the provisions of 10CFR21. B-W classified this failure as an isolated incident and stated that the cause had not been determined. After this failure, testing of B-W's replacement material was undertaken at Palo Verde.

B-W offered to replace the BVPS-2 impeller wear rings, throttle sleeves, and bushings with AISI 420 wrought material for the auxiliary feedwater pumps.

B-W's offer to replace existing AISI 440A parts to enhance auxiliary feedwater pump reliability, coupled with the experience of cracking of impeller wear rings on a BVPS-2 turbine-driven auxiliary feedwater pump (2FWE*P22) in 1981 (SDR 81-04) have raised concerns regarding the suitability of the 440A spuncast material for wear ring application.

2. IMMEDIATE ACTION TAKEN

As a result of the above concerns, BVPS-2 commenced a reportability evaluation under the requirements of 10CFR50.55(e). BVPS-2 decided to proceed with the replacement of the impeller wear rings, throttle sleeves, and bushings with AISI 420 wrought parts for the auxiliary feedwater pumps (refer to Section 5, "Corrective Action to Remedy Deficiency"). Mr. S. D. Hall, Acting Manager, Regulatory Affairs, DLC, notified Mr. Lowell Tripp, NRC Region I office of this reportable item on September 24, 1984.

3. DESCRIPTION OF THE DEFICIENCY

With the exception of the previous wear ring failure on a turbine driven pump, no damage has occurred to the BVPS-2 auxiliary feedwater pumps or auxiliary feedwater system. However, because of the similarity between the BVPS-2 and Palo Verde auxiliary feedwater pumps, the potential for a failure of the BVPS-2 wear rings and a reduction in pump performance/reliability does exist.

The failure mechanism for AISI 440A wear rings is such that numerous operating cycles are required to observe the tendency of the AISI 440A material to lose its properties of ductility and malleability. Physical changes in volume also result from the material's tendency to convert

retained austenite to untempered martensite, thus aggravating stress levels in the rings' retaining pins and contributing to further component degradation.

B-W has indicated that wear rings fabricated from AISI 420 wrought material are more reliable than rings fabricated from the AISI 440A spuncast material discussed above. Extreme endurance testing at Palo Verde also supports the use of AISI 420 in wear ring design/service by demonstrating reliability is higher than for the original AISI 440A material.

4. ANALYSIS OF SAFETY IMPLICATION

The failure of an impeller ring would most likely result in a degradation of performance for the affected pump stage. The presence of metal in the flow path, due to the initial ring failure, could potentially affect other stages within the pump by causing discharge flow path restrictions. This could ultimately lead to a reduction or loss of pumping capacity such that, coincident with another single failure in the auxiliary feedwater system, the plant's residual heat removal capabilities could be adversely impacted. The common-mode failure of impeller wear rings on multiple auxiliary feedwater pumps could also lead to unacceptable impacts on residual heat removal capabilities.

5. CORRECTIVE ACTION TO REMEDY DEFICIENCY

The auxiliary feedwater pump impeller wear rings, throttle sleeves, and bushings will be replaced by components fabricated with AISI 420 wrought material. This replacement effort, including reinstallation of the components into the BVPS-2 auxiliary feedwater pumps, is scheduled to be completed by December 1, 1984.

6. ADDITIONAL REPORTS

This is the final report and no additional reports are anticipated.