



Duquesne Light

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March 2, 1984

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

ATTENTION: Mr. Richard W. Starostecki
Division of Project and Resident Programs

SUBJECT: Beaver Valley Power Station - Unit No. 2
Docket No. 50-412
USNRC IE Inspection Report No. 50-412/83-13
Supplement Response Letter

Gentlemen:

This letter provides additional information relative to our previous response to the NRC Inspection Report 50-412/83-13 and as committed in Reference 1. The engineering evaluation to determine if the current installation is acceptable has been completed and is summarized below.

ENGINEERING EVALUATION

Problem Description

The applicable portion of the Specification for Structural Joints Using ASTM A325 or A490 Bolts dated April 18, 1972, is:

"Structural plate washers or a continuous bar not less than 5/16 inch in thickness are required to cover long slots that are in the outer plies of joints. These washers or bars shall have a size sufficient to completely cover the slot after installation."

The primary reason for this requirement is to ensure that the minimum required bolt pretension is maintained. Another reason for the requirement is to protect uncoated joint components from possible erosion.

BVPS-2 has installed approximately 786 structural joints with 3/4 inch diameter or 7/8 inch diameter ASTM A325 bolts, standard circular washers under both head and nut, and long slotted holes in the outer plies of the joint.

BVPS-2 has also installed an undetermined number of structural joints with 7/8 inch diameter ASTM A325 bolts, 5/16 inch plate washers, and long slotted holes in the outer plies of the joint. The plate washers are sized to completely cover the slots when the bolts are centered. However, in most of the connections, one end of the slot is exposed.

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For both of the above, connected parts are predominantly ASTM A36, although higher strength materials may have been used. Material substitutions are documented but were not retrieved since it is conservative to assume A36 in this instance.

Bolt Pretension

The ASTM A325 bolts installed in the above described configurations maintain the required minimum bolt preload. The loss of initial preload is no greater than normal (approximately 5 percent to 10 percent). This is substantiated based upon the calculated bearing area between the standard round washer and the slotted connected part and the allowable bearing pressure as determined from the following:

1. Journal of the Structural Division, ASCE, Vol. 94, No. ST9, September, 1968, "Bolted Joints with Oversize or Slotted Holes," by Ronald N. Allan and John W. Fisher.
2. "Guide to Design Criteria for Bolted and Riveted Joints," by John W. Fisher and John H. A. Strnik, John Wiley & Sons, Inc., 1974.

These references, based upon a testing program performed at Lehigh University, established that a loss of preload does not occur if the bearing area between washers and connected parts results in bearing stresses less than an allowable value for ASTM A36 connected parts. It has been confirmed that the calculated bearing pressure, based on required minimum fastener tension, is less than this allowable bearing pressure. Therefore, the long slotted hole connections at BVPS-2 maintain a bolt tension in excess of the required minimum bolt preload.

These structural joints at BVPS-2 were installed by turn-of-nut tightening with 100 percent SQC witnessing of the installation. In addition, SQC witnessed the torque obtained with calibrated wrenches on a minimum of 10 percent of the bolts, using at least two bolts per connection. This is verification that the required minimum bolt preload was achieved.

To allow uniform installation procedures, the "Specification for Structural Joints Using ASTM A325 or A490 Bolts" requires exactly the same plate washer for ASTM A325 bolts as for A490 bolts. However, required minimum fastener tension is at least 25 percent greater for A490 bolts. This results in reduced bearing stresses and conservative structural joints with A325 bolts.

Joint Protection

The joint protection afforded by a plate washer completely covering the long slot is unnecessary for the projected environment at BVPS-2. The intent of this requirement is to provide the same degree of sealing protection as normal, oversize, or short slotted holes for all exposures. These types of holes are not watertight, but do prevent foreign material from entering the holes. The connections with partially covered long slots at BVPS-2 are located inside heated industrial structures. Relative humidity between 20

percent and 90 percent is maintained. Sprays, mists, or corrosive chemicals are not present. In this environment, the degree of additional protection provided by completely covering the long slots is unnecessary.

Summary

The engineering evaluation has confirmed that the ASTM A325 bolts installed maintain the required minimum bolt preload. The additional joint protection afforded by plate washers completely covering the long slot is unnecessary for the environment at BVPS-2. No additional action need be taken in regards to the installed condition.

DUQUESNE LIGHT COMPANY

P. J. Woshinsky
By *For E. J. Woolever*
E. J. Woolever
Vice President

JS/wjs

cc: NRC Document Control Desk
Mr. G. Walton, NRC Resident Inspector
Ms. L. Lazo, Project Manager

REFERENCES: 1) 2NRC-9-098, dated December 8, 1983
2) NRC letter Docket No. 50-412, dated November 10, 1983

SUBSCRIBED AND SWORN TO BEFORE ME THIS
2nd DAY OF March, 1984.

Elva G. Lesondak
Notary Public

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

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COUNTY OF ALLEGHENY

On this 2nd day of March, 1984, before me, a Notary Public in and for said Commonwealth and County, personally appeared R. J. Washabaugh who being duly sworn deposed and said that (1) he is duly authorized to execute and file the foregoing Submittal on behalf of E. J. Woolever, 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