

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

REPORT/DOCKET NOS. 50-334/94-13
50-412/94-13

LICENSEE: Duquesne Light Company

FACILITY: Beaver Valley Power Station Units 1 and 2
Shippingport, PA

INSPECTION DATES: May 23-27, 1994

INSPECTOR:

Cheryl Beardslee
Cheryl Beardslee, Reactor Engineer
Materials Section
Division of Reactor Safety

6/21/94
Date

APPROVED BY:

Michael Modes
Michael Modes, Chief
Materials Section
Division of Reactor Safety

6/21/94
Date

Areas Inspected: As a result of a previous United States Nuclear Regulatory Commission (NRC) Inspection Report (IR) 50-412/93-25, one violation was identified (VIO 412/93-25-01). Duquesne Light Company, the licensee, submitted a letter to the NRC, dated January 11, 1994, which provided the basis for the request that the violation be withdrawn. The purpose of this inspection was to determine whether the violation should be withdrawn. The maintenance work request (MWR) involved in the violation was reviewed, in addition to several other MWRs with a similar work scope.

RESULTS: The inspector determined that Procedure 2CMP-75-FISHER VLV-1M had been appropriately revised in accordance with station procedures. In addition, through review of the calculations and the thought process used in revising Procedure 2CMP-75-FISHER VLV-1M, the inspector determined that the alternate method of obtaining a tight body-to-bonnet joint was acceptable. The inspector also determined, through the review of various other MWRs, that torquing of safety-related valves was being appropriately controlled through various different acceptable methods. Therefore, this inspection report provides the basis for withdrawal of Violation No. 50-412/93-25-01.

DETAILS

1.0 INTRODUCTION

As a result of a previous inspection, IR 50-412/93-25, one violation was identified (VIO 412/93-25-01). The violation involved a failure to implement the torque value established in a valve repair procedure. Duquesne Light Company, the licensee, submitted a letter to the NRC, dated January 11, 1994, which provided the basis for the request that the violation be withdrawn. The purpose of this inspection was to determine whether the violation should be withdrawn.

2.0 BACKGROUND INFORMATION

The purpose of the October 1993 NRC inspection, IR 50-412/93-25, was to determine the adequacy of the repair and maintenance of Safety Class 1 valves. MWR No. 3370 was reviewed, and one violation was identified. The purpose of MWR No. 3370 was to permanently repair a leak on air-operated valve (AOV) 2CHS-LCV460B. This was performed using Procedure 2CMP-75-FISHER VLV-1M, "Repair of Fisher Air-Operated Valves 21A88RG," Issue 4, Revision 0, dated May 23, 1991. The violation involved:

- 1) A failure to implement the torque value established in the repair procedure, 2CMP-75-FISHER VLV-1M; and
- 2) The failure to establish quantitative or qualitative acceptance criteria for the applied torque related to the nuts of the body-to-bonnet studs of AOV 2CHS-LCV460B.

3.0 MAINTENANCE WORK REQUEST #3370

Procedure 2CMP-75-FISHER VLV-1M was used to perform the work detailed by MWR No. 3370. The procedure required torquing of the body-to-bonnet stud nuts to 340 ft-lbs. Maintenance/I&C Procedure Field Revision (PFR) No. 92-PG2-023 was written to provide an alternate method for obtaining a tight body-to-bonnet joint. Due to valve body configuration and other component interferences, a torque wrench, which would have been used to obtain the appropriate torque, could not be utilized. PFRs are initiated when there is not adequate time to revise the procedure using the formal revision process. The inspector verified that the PFR had been initiated prior to using the alternate method. The inspector also verified that the PFR was reviewed and approved by the Onsite Safety Committee (OSC). The field revision provided the alternative of tightening the nuts until the body-to-bonnet gap was metal-to-metal within 0.002 inches. A quality control (QC) inspector had verified the body-to-bonnet gap, as was required by the PFR.

During the October 1993 NRC inspection, a concern was raised as to the adequacy of the alternate method of attaining a tight body-to-bonnet fit. Specifically, it appeared that the amount of torque applied to the nuts was not controlled, and thus could create an under or over torqued configuration. In their request for withdrawal of the violation, the licensee stated that, "In order for the body-to-bonnet gasket to provide a tight seal against leakage,

the gasket must be compressed a certain specified amount during initial joint tightening. In the case of 2CHS-LCV460B, the gasket compression is limited by the joint design. Once body-to-bonnet metal-to-metal contact is obtained, the full gasket compression is achieved, and further tightening will not further compress the gasket." The inspector reviewed licensee's Controlled Drawing No. 2007.820-001-001D, which had been obtained from the valve vendor at the time the valve was purchased. The drawing indicated appropriate gasket dimensions and body-to-bonnet gap when the gasket was fully compressed. The licensee indicated that proper gasket crush would assure adequate minimum torque. In response to NRC concerns that adequate gasket crush may not prevent undertorquing, the licensee performed calculations, which demonstrated that adequate minimum torque was achieved. The inspector verified that the new gasket used during repair of the valve met the drawing dimensions. This was done by review of the completed MWR package, which identified the gasket stock number, and review of stock records, which provided a description of the gasket dimensions. If gasket dimensions had been incorrect, the basis for assuming leak tightness could not be assured. To address the concern of overtorquing, the licensee performed calculations, which determined that a torque of 573 ft-lbs would have to be applied to cause yielding in the studs. The licensee indicated that a maximum of 250 ft-lbs had been applied to the studs, and, therefore, eliminated the concern of overtorquing.

The inspector determined that Procedure 2CMP-75-FISHER VLV-1M had been appropriately revised in accordance with station procedures. In addition, through review of the calculations and the thought process used in revising Procedure 2CMP-75-FISHER VLV-1M, the inspector determined that the alternate method of obtaining a tight body-to-bonnet joint was acceptable.

4.0 OTHER MAINTENANCE WORK REQUESTS

The inspector randomly selected the following MWRs that involved tightening of safety related valves:

<u>Unit 1</u>	<u>Unit 2</u>
MWR #019752	MWR #008901
MWR #020965	* MWR #009680
	* MWR #010162
	* MWR #011013
	MWR #011103

The inspector determined that for the four MWRs not marked with an asterisk (*), a specific torque had been delineated, and a torque wrench had been used to obtain the required torque. The torque values had been obtained from various vendor manuals. The valves affected by the three MWRs marked with an asterisk were not torqued to a specific value. The valves were of a similar design to that of AOV 2CHS-LCV460B, and Procedure 2CMP-75-FISHER VLV-1M, Issue 4, Revision 1, dated September 25, 1993, was used to perform the work. At this time, the alternate method of obtaining an adequate body-to-bonnet joint had been

permanently incorporated into the procedure. The inspector verified that the body-to-bonnet gap had been independently verified by a QC inspector. In addition, the MWRs stated that gasket dimensions should be confirmed prior to installation of the gasket. As was indicated in Section 3.0 of this report, this is an important quality check, which helps ensure that the alternate method causes adequate torque to be applied to the valve nuts.

In September 1993, Procedure 2CMP-75-FISHER VLV-1M was permanently revised. The inspector reviewed the procedure revision, and determined that the procedure did not provide any guidance to maintenance personnel on prevention of overtorquing. In the case discussed in Section 3.0 of this report, the licensee had determined that, due to the size of wrench used to torque the nuts, overtorquing had not occurred. The licensee indicated that good maintenance practices would prevent overtorquing of the valve in future applications of this procedure. Through interviews with various maintenance personnel, the inspector determined that it appeared that these maintenance practices were common at Beaver Valley Power Station, and that if these practices continued to be implemented, overtorquing would be prevented.

The inspector determined, through the review of various other MWRs, that torquing of safety-related valves was being appropriately controlled through various different acceptable methods.

5.0 CONCLUSIONS

The inspector determined that Procedure 2CMP-75-FISHER VLV-1M had been appropriately revised in accordance with station procedures. In addition, through review of the calculations and the thought process used in revising Procedure 2CMP-75-FISHER VLV-1M, the inspector determined that the alternate method of obtaining a tight body-to-bonnet joint was acceptable. The inspector also determined, through the review of various other MWRs, that torquing of safety-related valves was being appropriately controlled through various different acceptable methods. Therefore, this inspection report provides the basis for withdrawal of Violation 50-412/93-25-01.

6.0 EXIT MEETING

An exit meeting was held on May 27, 1994, with members of the licensee's staff noted in Attachment 1. The inspector discussed the scope and findings of the inspection.

Attachment 1 - Persons Contacted

ATTACHMENT 1

PERSONS CONTACTED

Duquesne Light Company

- * C. Custer, Director - Component Engineering
- * R. Hansen, Director - General Engineering
- * J. Johns, Supervisor - Quality Services
- * F. Lipchick, Senior Licensing Supervisor
- * B. Sepelak, Licensing Engineer
- * P. Slifkin, Mechanical Maintenance Engineering Supervisor
- * R. Snowdon, Quality Control Supervisor
- * J. Vassello, Director - Licensing

U.S. Nuclear Regulatory Commission

- * S. Greenlee, Resident Inspector

* Denotes those attending the exit meeting.

Duquesne Light Company

Beaver Valley Power Station
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January 11, 1994

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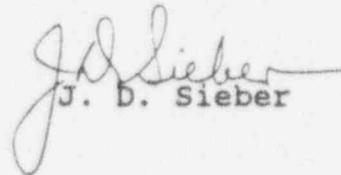
**Subject: Beaver Valley Power Station, Unit No. 2
 Docket No. 50-412, License No. NPP-73
 Inspection Report 50-412/93-25
 Reply to Notice of Violation**

In response to NRC correspondence dated December 6, 1993, and in accordance with 10 CFR 2.201, the attached reply addresses the Notice of Violation transmitted with the subject inspection report.

Note that we have performed a detailed review of the circumstances surrounding the alleged violation. Based on this evaluation, we respectfully request that this violation be withdrawn.

If there are any questions concerning this response, please contact Mr. N. R. Tonet at (412) 393-5210.

Sincerely,


 J. D. Sieber

Attachment

cc: Mr. L. W. Rossbach, Sr. Resident Inspector
 Mr. T. T. Martin, NRC Region I Administrator
 Mr. G. E. Edison, Project Manager
 Mr. Jacques P. Durr, Chief, Engineering Branch
 Division of Reactor Safety, Region I



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DUQUESNE LIGHT COMPANY
Nuclear Power Division
Beaver Valley Power Station Unit 2

Reply to Notice of Violation

Inspection Report 50-412/93-25
Letter dated December 6, 1993

VIOLATION (Severity Level IV, Supplement I)

Description of Violation (50-412/93-25-01)

10 CFR Part 50, Appendix B, Criterion V, requires, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.

Beaver Valley, Unit 2, UFSAR, Section 17.2.5, titled "Instructions, Procedures and Drawings," implements the above requirement.

Table 1 of licensee Procedure 2CMP-75-FISHER VLV-1M, Issue 4, Revision 0, contained in Work Request Number 003370 for valve 2CHS-LCV460B requires the 7/8" body-to-bonnet studs be torqued to 340 ft-lbs.

Contrary to the above, on April 5, 1992, the 7/8" body-to-bonnet studs were torqued until the body-to-bonnet gap was metal to metal within 0.002" and not to 340 ft-lbs as required in the above procedure.

Discussion of Alleged Violation:

Maintenance Work Request MWR-3370 made repairs to valve 2CHS-LCV460B during the Beaver Valley Unit 2 (BV-2) Third Refueling Outage (2R3). The 2R3 repair was necessary because the valve had previously leaked and had been temporarily repaired by leak repair injection. The repair procedure, 2CMP-75-FISHER VLV-1M, Issue 4, Revision 0, specified torquing the body-to-bonnet stud nuts to 340 ft-lbs. Since the valve body design and the valve location in the plant prevented use of a torque wrench, a procedure field revision, 92-PG2-023, was issued on 4/1/92 to permit the following alternate tightening method:

"Using an alternating sequence, incrementally tighten body nuts until body-to-bonnet gap is metal to metal within 0.002 inch."

The body-to-bonnet stud nuts were subsequently tightened using this alternate method on 4/5/92. This work was verified by a Quality Control Inspector.

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The NRC letter transmitting the violation expressed the concerns that applying torque to the body-to-bonnet studs of a safety related category 1 valve without controlling the amount of torque may create excessive tensile stress on the studs or may have created an under torqued configuration. Duquesne Light Company has evaluated these concerns and provides the following:

1. Discussions with Maintenance personnel assigned to this work indicated that the body-to-bonnet stud nuts were tightened using a wrench no longer than one foot long, and that no "cheater bars" or torque multiplying devices were used. It is reasonable to assume that a mechanic could not apply a force of more than 150 to 250 lbs. in tightening these nuts. Based on the use of a one foot long lever arm, the maximum torque applied would be conservatively estimated to be approximately 250 ft-lbs. This is well below the 340 ft-lbs specified in the vendor technical manual. In addition, we have calculated that a torque of 573 ft-lbs would be required to cause yielding in the studs.
2. In order for the body-to-bonnet gasket to provide a tight seal against leakage, the gasket must be compressed a certain specified amount during initial joint tightening. In the case of 2CHS-LCV460B, the gasket compression is limited by the joint design. Once body-to-bonnet metal to metal contact is obtained, the full gasket compression is achieved and further tightening will not further compress the gasket. We have calculated that the minimum nut torque necessary to compress the gasket to its optimum operating thickness is 120 ft-lbs. Based on a one foot lever arm and a minimum applied force of 150 lbs, a torque of 150 ft-lbs or greater would have been applied by the mechanic tightening the nuts. This would be more than enough to obtain the correct gasket compression. In fact, metal to metal contact within 0.002 inch was obtained in accordance with the procedure field revision in tightening the joint. It is also calculated that a 120 ft-lb joint preload is sufficient to prevent joint separation under system design pressure. A post maintenance in-service leak check was performed at normal operating temperature and pressure on 2CHS-LCV460B after repairs were made during 2R3 and no leakage was detected. This valve has been in service for more than one full fuel cycle and no body-to-bonnet leaks have been reported.

Based on the above discussion, we have determined that the torque applied to the body-to-bonnet studs was acceptable and did not create excessive tensile stresses or an under torqued configuration.

In conclusion, we respectfully request that the violation be withdrawn for the following reasons:

- A procedure field revision was processed prior to work on the valve to allow the alternate torque method to be used.
- The field revision provided a reasonable alternative to tightening the nuts to a specified torque value.
- The body-to-bonnet stud nuts were torqued using an alternating sequence and incrementally tightened until the body to bonnet gap was metal to metal within 0.002". This acceptance criteria was based on dimensions taken from an approved vendor drawing with the addition of a 2 mil (0.002") tolerance. This work was verified by a Quality Control Inspector.
- The alternate torque method used, compressed the flexitallic gasket so that it was fully activated and no subsequent leakage has been detected.
- A calculation to determine the actual torque applied based on the amount of gasket compression was subsequently performed and confirmed that the studs were not over torqued and that the joint is not in an under torqued configuration. This calculation is available for review.