PWR SAFETY AND RELIEF VALVE TEST PROGRAM, PORV BLOCK VALVE ADEQUACY REPORT

FOR

VIRGINIA ELECTRIC POWER COMPANY
NORTH ANNA UNIT 1 AND UNIT 2

AUGUST 1982

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1.0 INTRODUCTION

NUREG-0737, Item II.D.1.B requires PWR utilities demonstrate block valves function properly over expected operating and accident conditions. This demonstration is to be supported by test data.

During a meeting between the NRC staff and utility representatives on July 17, 1981, agreement was reached regarding resolution of the above requirement. Details of the utility position on block valve testing is contained in Reference 1.

In response to NUREG-0737, Item II.D.1.B, Reference 2 transmitted to the NRC "EPRI PWR Safety and Relief Valve Test Program, PWR Safety and Relief Valve Test Program, PORV Block Valve Information Package", May 1982 (Reference 3). Included in this submittal was:

- A description of block valves used in or planned for use in PWR plants.
- An EPRI report entitled "EPRI/Marshall Electric Motor Operated Valve (Block Valve) Interim Test Data Report," May 31, 1982.
- A Westinghouse report entitled "EPRI Summary Report: Westinghouse Gate Valve Closure Testing Program," March 31, 1982.

Reference 2 also states that PWR utilities believe sufficient evidence (supported by test data) is available to demonstrate block valve "operability". Response to the NUREG requirement was to be fulfilled by submittal of the above mentioned document package and a separate plant-specific evaluation of safety and relief valve operability.

This document provides the plant-specific response and evaluation of the Block Valve Test program for Virginia Electric Power Company's North Anna Unit 1 and Unit 2.

2.0 BLOCK VALVE DESIGN INFORMATION

The block valves installed at North Anna Units 1 and 2 are Velan model # B10-354B-13MS motor operated gate valves (described in Table 2-1) and Westinghouse model 3GM88 motor operated gate valve (described in Table 2-2).

During the EPRI Test program tests were conducted on a Velan model B10-3054B-13MS block valve and a Westinghouse model 3GM88 block valve at the Marshall test facility. Results of those tests are detailed in Reference 3.

For comparison a description of the Velan and Westinghouse test valves is provided in Table 2-3 and 2-4. As can be seen, the North Anna valves tested by EPRI are similar to the block valves installed at North Anna.

TABLE 2-1

VELAN PORV BLOCK VALVE DESCRIPTION

Velan Information

Manufacturer	Velan Engineering Companies
Description	Motor Operated Bolted Bonnet Gate Valve
Quantity	3 (Total)
Model	B10-354B-13MS
Drawing No	88418-3

Valve Operator Information

Manufacturer	Limitorque
Description	Motorized Valve Operator
Model	SMB-00-15
Voltage, Volts	460
Speed	10 sec. (open or closed)
RPM	1800

TABLE 2-2

WESTINGHOUSE PORV BLOCK VALVE DESCRIPTION

Valve Information

Manufacturer	Westinghouse Electric Corporation
Description	Motor Operated Gate Valve
Quantity	1
Model	3GM88
Drawing No	115E075

Valve Operator Information

Manufacturer	Limitorque
Description	Motorized Valve Operator
Model	SB-00-15
Voltage, Volts	460
Speed	10 sec.
RPM	3600

TABLE 2-3

TEST VALVE DESCRIPTION, TEST SERIES M-VE1*

General Valve Information

Manufacturer	Velan Engineering Companies
Description	Motor Operated Bolted Bonnet Gate Valve
Model	B10-3054B-13MS
Serial No.	765
Drawing	88425/B

General Valve Operator Information

Manufacturer	Limitorque
Description	Motorized Valve Operator
Model	SMB-00-15
Serial No.	243402
Torque Switch Setting	1.7
Voltage	460
RPM	1700

*Source: Reference 3

TABLE 2-4

TEST VALVE DESCRIPTION, TEST SERIES M-WS1**

General Valve Information

Manufacturer	Westinghouse Corporation
Description	Motor Operated Gate Valve
Model	MOD03000GM88FNB0D0 (88 Series)
Serial No.	*
Drawing No	8374D34

General Valve Operator Information

Manufacturer	Limitorque
Description	Motorized Valve Operator
Model	SB-00-15
Serial No.	*
Torque Switch Setting	*
Voltage	575
RPM	3600

*Not Supplied by the manufacturer
**Source: Reference 3

3.0 SUMMARY OF BLOCK VALVE TEST RESULTS

3.1 Velan Block Valve

Results of the Velan block valve tests are contained in Section 3.1 of Reference 3.

The evaluation tests were performed at the Marshall Steam Station test facility with the Copes-Vulcan PORV installed downstream of the Velan test valve. The Velan valve was cycled 21 times and the results of these tests are summarized in Table 3.1-3 of reference 3. Seat leakage, flow and stroke tests were conducted.

The test valve was cycled against full flow at 2340-2500 psi nominal line pressures. EMOV stroke times were reported between 9.7 and 9.9 seconds. No appreciable seat leakage was measured. The valve fully opened and closed on demand for each of the 21 test cycles.

Additional supplementary tests were conducted to evaluate valve operability with reduced operator torque. Results of these tests were summarized in Table 3.1-4 of reference 3. The valve fully opened and closed on demand for each of the supplementary test cycles.

Following the testing program, the Velan test valve was disassembled and inspected. Very slight galling of the guides was observed but all other parts including seating surfaces were found to be in good condition.

3.2 Westinghouse Block Valve Model 3GM88

Results of the Westinghouse 3GM88 Block Valve Tests are contained in Section 3.2 of reference 3.

The evaluation tests were conducted at Marshall Steam Station test facility with the Control Components International PORV mounted downstream of the Westinghouse test valve. The valve was cycled 21 times and the results of these tests are summarized in Table 3.2-3 of reference 3.

Prior to initiation of the evaluation tests, several attempts were made to outfit the valve with a motor operator with 575 volt capability as required by the Marshall test facility electric power supply. Initially no 575 volt Limitorque operator was available so several Rotork operators, available at that time, were tried. During these preliminary checkouts, difficulty was encountered with closing the valve completely. Finally a 575 volt Limitorque SB-00-15 operator was made available and installed on the test valve.

On the initial evaluation test, considerable valve packing leakage was observed. The packing was tightened to stop the leakage. When the valve was cycled it remained 4% open. The torque switch setting was increased and the valve closed fully on the second attempt and throughout the remainder of the evaluation tests.

The valve was cycled against full flow at 2280-2420 psi nominal line pressures. Stroke times were reported between 6.2 and 12.9 seconds. No appreciable seat leakage was measured. The valve fully opened and closed for 20 of the 21 evaluation cycles. As stated above, the valve closed to within 4% of closure for the first cycle.

Supplemental test results are summarized in table 3.2-4 of reference 3 and detail the calibration and checkout activities that were carried out during the period of June 27, 1980, to August 11, 1980, as well as two additional cycles which occurred after the evaluation tests.

The test valve was inspected after the evaluation tests and all internal parts were in good condition.

A subsequent examination made after all testing showed the wedge guides evidenced some galling but all other parts were in good condition.

During the testing at Marshall, the stem thrust required to close the valve was measured using axial-type strain gages. The resulting forces were considerably higher than expected. When subsequent closure problems occurred in Spain a series of tests and analyses were conducted by Westinghouse to determine the cause of the higher than expected closing loads. A report of this testing and analysis is contained in reference 3.

This report concludes the closure problems encountered were the result of under-predicting the stem thrust required to close the valve against high differential pressures. The standard closing load equation used by Westinghouse had to be modified based on test results.

Several of the other valves in the EPRI program closed quite successfully even though their actuators were most likely sized using the 0.3 valve factor. This can be explained by the difference in operator sizing philosophy between Westinghouse and most other valve companies. Most other companies allow Limitorque to perform their operator sizing. The standard Limitorque technique has sufficient margin built into it at other points of the sizing calculation that the final operator is adequate and most valves would close at the higher actual loads.

4.0 CONCLUSIONS

The Velan and Westinghouse valves tested at the Marshall Steam Station as part of the EPRI Safety and Relief Valve test program are similiar in design to the block valves installed at North Anna Unit 1 and Unit 2 and these valves successfully completed the evaluation and supplementary test program, fully opening and closing on demand.

Furthermore, the Westinghouse model 3GM88 block valve installed at North Anna has been modified by Westinghouse to provide sufficient closing thrust as determined in the Westinghouse test program.

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

R. H. LEASBURG
VICE PRESIDENT
NUCLEAR OPERATIONS

September 1, 1982

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
Attn: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Serial No. 506
NO/DJF:ms
Docket Nos. 50-280
50-281
License Nos. DPR-32
DPR-37

Gentlemen:

NUREG 0612 - CONTROL OF HEAVY LOADS
SURRY POWER STATION
UNIT NOS. 1 AND 2

On August 12, 1982 a conference call was held between Vepco, the NRC and Franklin Research Center personnel. The following information is provided concerning areas requiring further action as a result of the conclusion and recommendations shown in the draft Technical Evaluation Report for Control of Heavy Loads at Surry Power Station and the August 12, 1982 conference call.

TER 2.1.2 SAFE LOAD PATHS {GUIDELINE, NUREG-0612, SEC. 5.1.1(1)}

Comment:

It was stated by the NRC that in order for Surry to fully comply with the guidelines, the licensee should clarify the procedure for handling deviations from safe load paths.

Response:

Vepco stated that this information is presently available to the NRC and that it could be found in Section 5 of Vepco's Nuclear Power Station Quality Assurance Manual and in Section 6 of the Surry Power Station Technical Specifications. The procedure for deviations to procedures requires review by station supervisory personnel with a followup review by the Station Nuclear Safety and Operating Committee.

TER 2.1.4 CRANE OPERATOR TRAINING {GUIDELINE 1, NUREG-0612, SEC. 5.1.1(3)}

Comment:

Under Section b. Evaluation of 2.1.4 it was stated that the licensee should ensure that a mechanism is in place to provide future crane operator training that meets the intent of ANSI B30.2-1976, Chapter 2-3.

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Response:

Surry Power Station presently has procedures for the initial training of crane operators. There are presently no provisions for retraining or future operator training beyond the initial training of the personnel.

By the next refueling outage at Surry Power Station procedures will be developed to provide future crane operator training that meets the intent of ANSI B-30.2-1976, Chapter 2-3.

TER 2.1.5 SPECIAL LIFTING DEVICES {GUIDELINE 4, NUREG-0612, SEC. 5.1.1(4)}

Comment:

The NRC stated that they would like the schedule dates that Vepco has for the completion of the Westinghouse analyses of special lifting devices used at Surry Power Station.

Response:

The dates for completion of the analyses as provided by Westinghouse and submittal to Vepco are as follows:

- January 1, 1983 - Preliminary Stress Report

- February 1, 1983 - Preliminary Evaluation

- March 1, 1983 - Final Report

After internal review Vepco would submit the results of this review by no later than March 31, 1983.

TER 2.1.6 LIFTING DEVICES (NOT SPECIALLY DESIGNED) {GUIDELINE 5, NUREG-0612 SEC. 5.1.1(5)}

Comment:

The NRC stated that an evaluation must be performed to determine the significance of dynamic loads on the slings used for lifting heavy loads. If there are significant dynamic loads slings shall be marked to indicate which slings are restricted in use to only certain cranes.

Response:

Vepco will evaluate the significance of dynamic loads on the slings used and provide the NRC with the information by October 15, 1982. If the results of the evaluation indicate the necessity to mark the slings, they will be marked prior to their next scheduled use.

TER 2.2.3 SPECIAL REVIEW FOR HEAVY LOADS HANDLED OVER THE CORE {INTERIM PROTECTION MEASURE 6, NUREG-0612, SEC. 5.3(6)}

Comment:

The NRC stated that the licensee should verify that the one-time visual inspections of load bearing components of cranes, slings, and special lifting devices to identify flaws or deficiencies that could lead to a component failure have been performed and the appropriate repairs/replacments have been completed.

Response:

Surry Power Station Preventative Maintenance Procedure MMP-P-CR-015 for periodic inspections of containment cranes and lifting equipment satisfies this requirement.

Per this procedure cranes, reactor head and internals lifting rigs are inspected prior to each refueling and at each containment maintenance period if they are to be used and have been idle for a period of more than six (6) months or the last inspection has been over one (1) year.

The reactor coolant pump motor lifting rig and wire rope slings are inspected prior to each refueling and at each containment maintenance period if they are to be used and the last inspection has been over one (1) month.

The one time inspection required will be performed prior to the next refueling in accordance with the above procedure.

If you have any questions or require further clarification concerning the above subjects, please advise.

Very truly yours,

R. H. Leasburg

cc: Mr. James P. O'Reilly, Regional Administrator
Region II
Atlanta, Georgia 30303