

50.55(e) Report

Arizona Public Service Company

P.O. BOX 21666 • PHOENIX, ARIZONA 85036

November 5, 1982
ANPP-22216-GHD/BSK

U. S. Nuclear Regulatory Commission
Region V
Creskide Oaks Office Park
1450 Maria Lane - Suite 210
Walnut Creek, California 94596-5368

Attention: Mr. D. M. Sternberg, Chief
Reactor Projects Branch 1

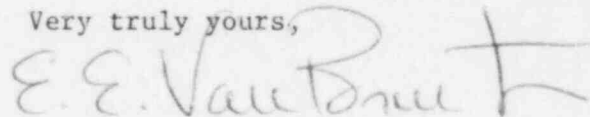
Subject: Final Report - Revision 1 - DER 80-30
A 50.55(e) Report Relating to Borg-Warner 3", 1500#,
Motor-Operated Gate Valve Failure To Close Under Operating
Conditions Per NRC I&E Bulletin No. 81-02
File: 82-019-026; D.4.33.2

Reference: (A) ANPP-16653 dated October 31, 1980 (Final Report)

Dear Sir:

Attached is our revised Final Report of the deficiency referenced above,
which has been re-evaluated as Not Reportable under the requirements of
10CFR50.55(e).

Very truly yours,



E. E. Van Brunt, Jr.
APS Vice President,
Nuclear Projects
ANPP Project Director

EEVB/GHD:wp
Attachment

cc: See Attached Page 2

U. S. Nuclear Regulatory Commission
Attention: Mr. D. M. Sternberg, Chief

November 5, 1982
ANPP-22216-GHD/BSK

Page 2

cc: Richard DeYoung, Director
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

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FINAL REPORT - REVISION 1 - DER 80-30

DEFICIENCY EVALUATION 50.55(e)

ARIZONA PUBLIC SERVICE COMPANY (APS)

PVNGS UNITS 1 & 2

I. DESCRIPTION OF DEFICIENCY

During testing in November, 1979 at Duke Power, a Borg Warner 3", 1500# motor operated gate valve failed to completely close when actuated under operating conditions of 2485 psi at 650° F. with a flow rate of 220,000 lbs. per hour of steam. Testing by Duke Power in conjunction with Borg Warner, Nuclear Valve Division, determined the potential failure to be inadequate guiding of the valve gate.

Borg Warner filed a 10CFR Part 21 Notification Report with the NRC on February 16, 1980 covering this condition. Supplemental testing was performed by Borg Warner in response to the corresponding NRC I&E Bulletin 81-02. The results of the test demonstrated that the valve assembly as delivered to Palo Verde successfully passed the flow interruption tests, resulting in zero leakage/5 minutes in the normal flow direction; the valve fully closed after the test conditions.

II. ANALYSIS OF SAFETY IMPLICATIONS

This condition has been re-evaluated as not reportable based on the results of the attached supplemental flow interruption test(s). If left undetected and uncorrected, this condition would not have represented a safety significant condition.

III. CORRECTIVE ACTION

Nonconformance Report P-A-K43 has been dispositioned Use-As-Is.

Tel. 203/688-1911
Telex 99297



June 11, 1981
V-CE-14544

Mr. E. E. Van Brunt, Jr.
Arizona Nuclear Power Project
P. O. Box 21666
Phoenix, Arizona 85036

Subject: NRC I&E Bulletin 90-02, Failure of Gate Type
Valves to Close Against Differential Pressure
File: D.4.01.1; 81-001-419.1

Reference: ANPP-17796-JMA/NEM, April 16, 1981

Enclosure: Report #1843, Rev. A, Flow Interruption Test
for P/N 77910, Valves, Borg-Warner-NVD

Dear Mr. Van Brunt:

The referenced letter forwarded a copy of the subject bulletin to Bechtel requesting information on any valves in the C-E scope of supply.

There are two valves per unit associated with this bulletin; SI-604 and SI-609. These are motor operated valves supplied by Borg-Warner, NVD P/N 77910. The bulletin stated that supplemental testing to determine threshold differential pressures for less severe service had yet to be done. Borg-Warner submitted a 10CFR21 report indicating facilities where the valves had failed to fully close. The enclosure is the supplemental test report results which was prepared by Borg-Warner in response to the bulletin.

Please note that Borg-Warner Valve P/N 77910 is the same as P/N 79190, except for the weld preparation. The actual tests were conducted on the 79190 valve by AETL. Their report 548-9142 dated May 8, 1981, is also attached.

The results of the test conducted in response to the concerns raised in the bulletin demonstrated that the valve assembly successfully passed the flow interruption tests, resulting in zero leakage/5 minutes in the normal flow direction; the valve fully closed after the test conditions.

Please contact me, if you have any questions.

Very truly yours,

C. Ferguson /
Project Manager

CF/es

Enclosures

cc: F. W. Hartley - w/e
W. H. Wilson
W. G. Bingham - w/e

R. H. Holm
W. L. MacDonald
G. A. Butterworth

S. N. Mager
D. B. Amerine
G. C. Andognini

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JOB 10407
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Nuclear Valve Division

Borg-Warner Corporation

7500 Tyrone Ave., Van Nuys, California 91409



Energy
Equipment

REPORT NO. 1843

PAGE 1 of 4

DATE 23 March 1981

REV A 3-25-81

FLOW INTERRUPTION TEST
FOR
PART NO. 77910
SUPPLIED TO
COMBUSTION ENGINEERING, INC.
ARIZONA NUCLEAR POWER PROJECT
PALO VERDE NUCLEAR GENERATING STATION
SPECIFICATION NO. 14273-PE-705

Prepared by:

A handwritten signature in dark ink, appearing to read "B. A. Patel", written over a horizontal line.

B. A. Patel
Project Engineer

Approved by:

A handwritten signature in dark ink, appearing to read "C. Braley", written over a horizontal line.

C. Braley
Manager, Design Engineering

Approved by:

A handwritten signature in dark ink, appearing to read "M. Riaz", written over a horizontal line.

M. Riaz
Manager, Valves

Nuclear Valve Division



CHANGE RECORD SHEET

REPORT NO. 1843
 PAGE 1.1
 REVISION B
 DATE 5/18/81

REVISIONS						
DATE	PAGES AFFECTED			DESCRIPTION	APPROVED BY	REV
	REVISED	ADDED	REMOVED			LTR
5/18		X		Seat Leakage Test Results Attachment 1		B
		X		AETL Report No. 548-9142		B

Prepared by: B. A. Patel
 B. A. Patel

Approved by: C. Braley
 C. Braley

Nuclear Valve Division

Borg-Warner Corporation
7500 Tyrona Ave., Van Nuys, California 91409



Energy
Equipment

REPORT NO. 1843

PAGE 2 of 4

1.0 PURPOSE

- 1.1 To demonstrate that the valve will perform satisfactorily when subjected to flow interruption.

2.0 REFERENCES

- 2.1 Combustion Engineering Specification No. 14273-PE-705.
- 2.2 ASME Boiler and Pressure Vessel Code Section III, 1974 Edition.
- 2.3 MSS-SP-61 - Hydrostatic testing of steel valves.
- 2.4 NVD P/N 79190 identical to 77910 except weld prep. Actual test will be conducted on P/N 79190.

3.0 TEST EQUIPMENT REQUIRED

- 3.1 High flow water system ref. para. 6.1.1.

4.0 PRETEST REQUIREMENTS

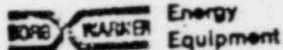
- 4.1 Test valve shall have gate visually examined through valve ports. Any evidence of defects shall be noted.
- 4.2 Test valve shall be tested per applicable acceptance test procedure.
- 4.3 Required pipe connections with adapter ends shall be attached to valve prior to start of test.
- 4.4 A photograph of each test setup shall be taken and is to be included as part of test report.

5.0 POST TEST REQUIREMENTS

- 5.1 After completion of all tests, valve shall be tested per applicable acceptance test procedure.
- 5.2 Valve gate shall be visually examined through valve ports for any evidence of galling.

Nuclear Valve Division

Borg-Warner Corporation
7500 Tyrone Ave., Van Nuys, California 91409



REPORT NO. 1843

PAGE 3 of 4 A

6.0 TEST OUTLINE

6.1 Valve Leakage Test and Cycle Test

These tests will be performed as part of standard valve acceptance test procedure.

6.2 Flow Interruption Capability Tests

6.2.1 Test valve flow requirements are listed in the following table:

<u>Inlet or Head Press (PSI)</u>	<u>Flow (GPM)</u>	<u>Valve Close Time (Sec) Max</u>
2500	600	30

6.2.2 Install valve in a test system capable of meeting the flow and pressure requirements specified in para. 6.2.1. Instrumentation required to simultaneously record upstream total pressure and downstream static pressure (ref. Figure 1).

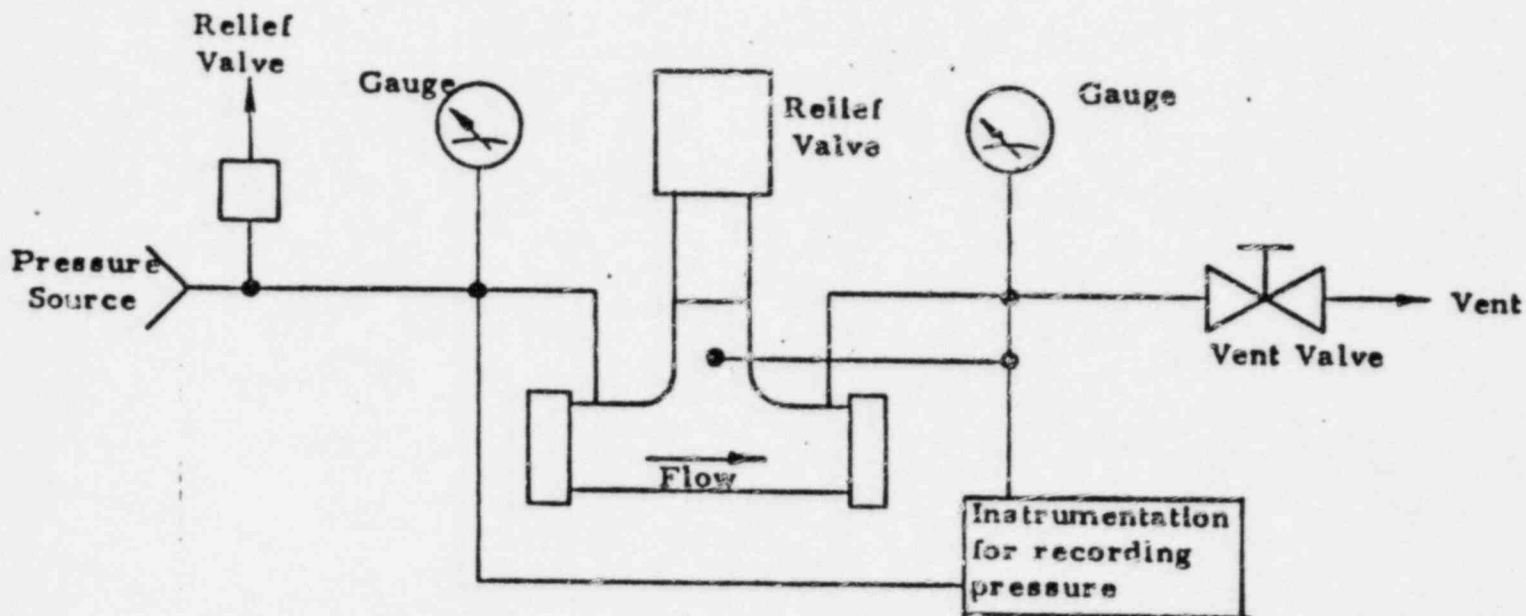
6.2.3 Downstream end of valve shall discharge to atmosphere or suitable low pressure receiver.

6.2.4a Start with valve in full open position and close valve. During the closing cycle, flow through the valve shall at least equal that noted in para. 6.2.1 with the differential pressure increasing to the value noted.

6.2.4b Start with valve in full close position and open the valve. (Valve must be full open). During the opening cycle, flow through the valve shall at least equal that noted in para. 6.2.1 with the differential pressure increasing to the value noted.

6.2.5 Following completion of flow test, check valve leakage per applicable acceptance test procedure.

6.2.6 The above test shall be performed a total of 3 closing and opening cycles.



TEST SETUP
FIGURE 1

Nuclear Valve Division

Borg-Warner Corporation
7500 Tyrone Ave., Van Nuys, California 91409

BORG-WARNER Equipment

PAGE 1 of 1

ATTACHMENT 1

ATTACHMENT TO REPORT NO. 1843
RESULTS OF FLOW INTERRUPTION TESTNVD Part No. 79190
Serial No. 25709

TVA Tag No. _____

Description 3" Gate ValveSeat Leakage Test Pressure
2500-2550 psig

TEST	PRESSURE		FLOW	
	Closing	Opening	Closing	Opening
1				
2				
3				

SEAT LEAKAGE ONE SIDE 0 CC / 5 MIN NORMAL FLOW DIRECTION
OTHER SIDE 200 CC / 5 MIN OPPOSITE DIRECTIONNVD
FT
236Test Performed by: P. MaciasWitnessed by: R. H. Tut 5-14-81

PHOTOGRAPH OF ALL SETUPS ON NEXT PAGE

ATTACHMENT TO TRANSMITTAL

On Attachment 1 of Report 1843 it is noted that the seat leakage is OCC/5 minutes in the normal flow direction and that it is 200 CC/5 minutes in the reverse direction.

It should be noted that the valve assembly has successfully passed the flow interruption test since the specimen performed its required function in the required time and upon completion of the test demonstrated 0 leakage in the direction the valve was flow tested. The increased leakage in the reverse direction is the result of debris in the test media which caused a slight scratch on the upstream side of the gate. Examination of the gate reveals a single linear scratch which shows no evidence of being caused by valve failure to close under flow.



APPROVED ENGINEERING TEST LABORATORIES
A NATIONAL TECHNICAL SERVICES CO.

Report No. 548-9142

P.O. No. 46085-4481

Date: 8 May 1981

Report Number 548-9142

Flow Interruption Test

on

Gate Valve Assembly

Part Number: 79190
Serial Numbers: 25709

TESTED FOR:

BORG-WARNER CORPORATION
Nuclear Valve Division
7500 Tyrone Avenue
Van Nuys, CA 91409

TESTED BY:

APPROVED ENGINEERING TEST LABORATORIES
9551 Canoga Avenue
Chatsworth, CA 91311
(213) 341-0830



APPROVED ENGINEERING TEST LABORATORIES
A NATIONAL TECHNICAL SERVICES CO.

Report No. 548-9142 pg 11

APPROVALS

Written By: Nancy Hickok Date: 8 May 1981
PUBLICATIONS, Nancy Hickok

Approved By: David P. Bame Date: 5-11-81
PROJECT MANAGER, David Bame

Approved By: Howard E. Clark Date: 5-11-81
QUALITY CONTROL MANAGER, Howard E. Clark





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1.0

PURPOSE

The purpose of this report is to present the test procedure used and the test results obtained during a test program. The objective of the test program was to determine the conformance of One (1) Gate Valve Assembly, Part Number 79190 (Serial Number 25709), to the Flow Interruption Test requirement specified in References 2.1 and 2.2, in accordance with Reference 2.3.

2.0

REFERENCES

2.1

Borg Warner Corp., Nuclear Valve Division, Report No. 1836, titled "Flow Interruption Test for Part No. 79190, Supplied to Tennessee Valley Authority Bellefonte Nuclear Plant Units 1 and 2," dated 9 February 1981.

2.2

Borg Warner Corp., Nuclear Valve Division, Report No. 1843, Revision A, titled "Flow Interruption Test for Part No. 77910, Supplied to Combustion Engineering, Inc. Arizona Nuclear Power Project, Palo Verde Nuclear Generating Station", dated 25 March 1981.

2.3

Borg Warner Corporation, Purchase Order No. 46085-4481.

3.0

SUMMARY

3.1

One (1) Gate Valve Assembly, described in Paragraph 1.0 and hereafter referred to as "Specimen," has been subjected to Flow Interruption Testing as described in this report. During the final test cycle, the Specimen indicator plate retaining nuts loosened causing the plate to make contact with the eyebolts. The plate was slightly bent as a result of the impact. All other results conformed to the specification requirements and no further adverse effects were noted.

3.2

All results are presented for evaluation.



4.0 TEST CONDITIONS AND TEST EQUIPMENT

4.1 Test Conditions

Unless otherwise specified herein, all tests were performed at room ambient conditions: defined as a temperature of $73 \pm 18^{\circ}\text{F}$ ($23 \pm 10^{\circ}\text{C}$), a relative humidity of 50 ± 30 percent, and a barometric pressure of $28.5 \pm 2.0, -3.0$ inches of mercury absolute ($725 \pm 50, -75$ mm of mercury absolute).

4.2 Test Equipment

The test equipment presented in the Appendix was calibrated, as required, in accordance with MIL-C-45662A and is traceable to the National Bureau of Standards (NBS). The NBS traceability records are maintained on file in the AETL Quality Control Office.



5.0 TEST PROCEDURES AND TEST RESULTS

5.1 Flow Interruption Test

References 2.1 and 2.2, Paragraph 6.2

Date Commenced: 6 April 1981

Date Completed: 28 April 1981

- 5.1.1 The Specimen was installed in the pressure flow test system as shown in Photograph 1. Instrumentation was installed to simultaneously record upstream total pressure and downstream static pressure. The downstream end of the valve was discharged to the atmosphere in a suitable receiving chamber.
- 5.1.2 Prior to each test cycle, the test system was hydrostatically pressurized to 2900 psi and held for a period of 15 minutes. The test system was then inspected for leakage and repairs were made as necessary.
- 5.1.3 The Specimen was cycled from full open to full closed to full open without pressure or flow to time the Specimen stroke. The Specimen close time was recorded at 15 seconds. The Specimen and test system were inspected for leakage or damage. No discrepancies were noted.
- 5.1.4 The Specimen was then cycled from full open to full closed to full open with the inlet pressure maintained at a minimum of 2500 psi. Water was flowed through the Specimen by opening an AETL valve downstream and regulation of the flow was achieved by installing an orifice between the Specimen and the AETL valve. Each full open to full closed cycle was 15 seconds in duration. During the closing cycle, the flow rate did not meet the specification requirement of 600 gpm minimum. The customer was notified and determined that the three runs partially satisfied the test requirement specified in Reference 2.1, Paragraph 6.2.4(b).
- 5.1.5 The test system was modified to meet the minimum flow requirement. Three full open to full closed test cycles were completed at a minimum flow rate of 600 gpm, and while maintaining the pressure above 2500 psi. Each Specimen open to close cycle lasted for a period of 15 seconds. These three runs satisfied the test requirement specified in Reference 2.1, Paragraph 6.2.4 and in Reference 2.2, Paragraph 6.2.4(a).



5.1.6

The Specimen was subjected to three additional test runs from the fully closed position to the off seat position until flow was established. The pressure was maintained at a minimum of 2675 psi. The completion of these test cycles fully satisfied the test requirement specified in Reference 2.2, Paragraph 6.2.4(b). The qualification requirements for Part No. 77910 were also satisfied on completion of Flow Interruption Testing.

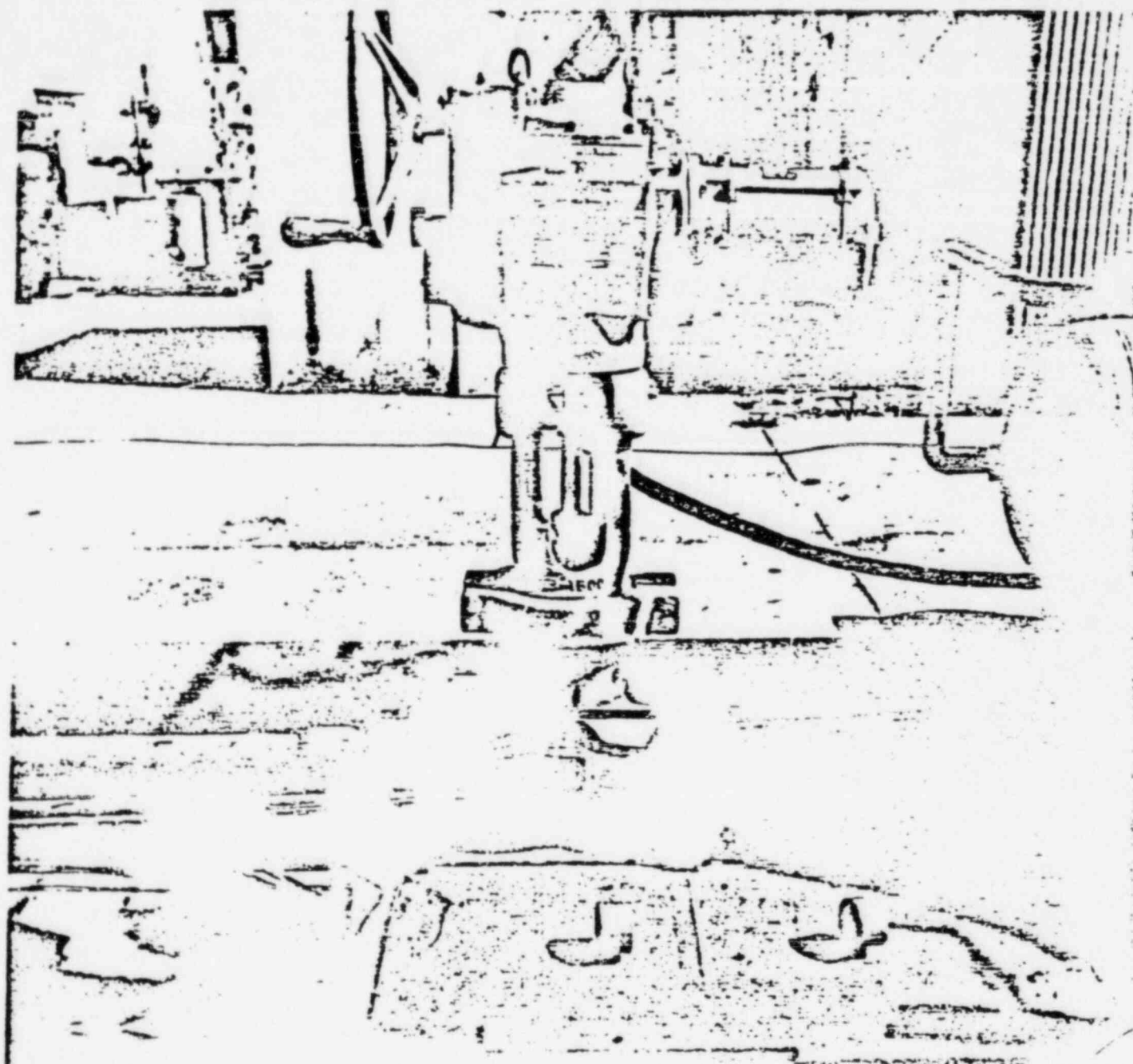
5.1.7

Following each test cycle, the Specimen was inspected for any discrepancies that may have occurred during testing. During the last test cycle, the indicator plate retaining nuts on the Specimen had loosened causing the plate to make contact with the eyebolts. The plate was slightly bent as a result, but no significant damage or discrepancies were reported. No further adverse effects were detected during testing. This concluded testing and the Specimen was returned to Borg Warner, Nuclear Valve Division.

* * *



REPORT NO. 548-9142 pg 5
PHOTOGRAPH 1
FLOW INTERRUPTION TEST SETUP



APPENDIX

Test Equipment List



AETL Number	E1126V
Instrument	Digital Multimeter
Manufacturer	Valhalla Scientific
Model Number	4440
Serial Number	7-3347
Calibration	6 months (cal due 9-28-81)
Range and Accuracy	0 to 500 volts AC in 5 ranges; 0 to 1000 volts DC in 5 ranges; AC volts, $\pm 0.25\%$ of range; DC volts, $\pm 0.05\%$ of range.

AETL Number	E1162V
Instrument	Oscilloscope, 24 channel
Manufacturer	Heiland Div., Honeywell
Model Number	1108-206780HK
Serial Number	11-630
Calibration	Prior to test
Type	8-inch/direct writing
Chart Speed	0.05-40 in./sec. in 12 steps

AETL Number	E1353S
Instrument	Signal Conditioner
Manufacturer	Calico
Model Number	X1101
Serial Number	None
Calibration	Prior to test
Type	Bridge

AETL Number	Unknown
Instrument	Pressure Transducer
Manufacturer	Teledyne
Model Number	206-NA
Serial Number	None
Calibration	Prior to test
Range	0 to 3000 psi



AETL

APPROVED ENGINEERING TEST LABORATORIES
A NATIONAL TECHNICAL SERVICES CO.

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AETL Number	P1087V
Instrument	Pressure Gauge
Manufacturer	Ashcroft
Model Number	Maxisafe
Serial Number	None
Calibration	For indication only
Range and Accuracy	0 to 3000 psig; $\pm 0.5\%$

AETL Number	P1157V
Instrument	Pressure Gauge
Manufacturer	Ashcroft
Model Number	1082D
Serial Number	None
Calibration	For indication only
Range and Accuracy	0 to 3000 psi, $\pm 0.5\%$

AETL Number	E1108V
Instrument	Digital Thermometer
Manufacturer	John Fluke Mfg. Co., Inc.
Model Number	2100A
Serial Number	30037
Calibration	6 months (cal due 6-8-81)
Range and Accuracy	-320°F to +1400°F; $\pm 1^\circ\text{F}$, ± 1 digit

AETL Number	P940V
Instrument	Pressure Transducer
Manufacturer	Statham Instruments, Inc.
Model Number	PM80TCF ± 100 -350
Serial Number	1091
Calibration	Prior to test
Range and Accuracy	5000 psig



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AETL Number	P1084V
Instrument	Pressure Gauge
Manufacturer	Ashcroft
Model Number	1.66
Serial Number	None
Calibration	For indication only
Range and Accuracy	0 to 3000 psi; 1.0%

AETL Number	P1129V
Instrument	Pressure Gauge
Manufacturer	Ashcroft
Model Number	1377S
Serial Number	None
Calibration	For indication only
Range and Accuracy	0 to 400 psig; $\pm 0.5\%$

AETL Number	P1045V
Instrument	Pressure Gauge
Manufacturer	U.S. Gauge Company
Model Number	1903
Serial Number	None
Calibration	For indication only
Range and Accuracy	0 to 200 psi; $\pm 0.5\%$

AETL Number	P1064V
Instrument	Pressure Gauge
Manufacturer	U.S. Gauge Company
Model Number	1818
Serial Number	None
Calibration	For indication only
Range and Accuracy	0 to 5000 psi; $\pm 0.5\%$



APPROVED ENGINEERING TEST LABORATORIES
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AETL Number	P1158V
Instrument	Flow Interrupt Test System
Manufacturer	AETL
Model Number	None
Serial Number	None
Calibration	Hydrostatically pressurized prior to test
Range and Accuracy	0 to 3000 pounds, 0 to 1500 GPM

AETL Number	P625V
Instrument	Pressure Gauge
Manufacturer	Ashcroft
Model Number	1079
Serial Number	None
Calibration	For indication only
Range and Accuracy	0 to 3000 psi, $\pm 0.25\%$

AETL Number	P1404S
Instrument	Pressure Transducer
Manufacturer	Teledyne
Model Number	206-SA-1-3000
Serial Number	662309
Calibration	Prior to test
Range and Accuracy	0 to 3000 psi

AETL Number	P1210S
Instrument	Pressure Gauge
Manufacturer	Ashcroft
Model Number	DS
Serial Number	None
Calibration	For indication only
Range and Accuracy	0 to 3000 psi; $\pm 0.5\%$