

Nuclear Regulatory Commission Notification Desk Fax:301-816-5151 12/16/03

Subject: Potential 10 Part 21 Concern

Dear Sir or Madam:

Please find attached Automatic Valves' analysis of a potential 10 CFR Part 21 concern regarding a specific lot of fluorocarbon rubber Inserts.

The following plants have components containing the suspect lots as follows.

Nebraska Public Power - Cooper Station:

Part Number	Purchase Order Number	Date Originally Shipped	Quantity	Serial Numbers
2028123	4500026300	01/09/2003	20	63927,64123-64141

Exelon:

Part Number	Purchase Order Number	Date Originally Shipped	Quantity
11472929 (Limerick)	90002981	03/31/2003	3
11587926 (Peach Bottom)	9002625	02/13/2003	8
22434-1 (Quad Cities)	00052264	02/19/2003	4
1385449-1 (Dresden)	00051141	11/26/2002,12/12/2002	67

Please call if you have any questions or concerns.

d

Todd Hutchins CEO Automatic Valve

IE19

P. 01

★ C DEC²16-2003 TUE 04:00 PM AUTOMATIC VALVE

AUTO	MATIC	VALVE	NUMBER: D7174-0	03	PAGE 1 OF 3
TITLE	: CORR	ECTIVE ACTION	LOCN: I:\WORD\D	OCUMENT\D7174003.DO	C DATE: 10-21-1999
SUBJ	: CORR	ECTIVE ACTION	TYPE: FORM	DEPT RESP: DQA	REV: F-CN8020
REQL	JIREME	INTS:			
		······································		······	
NUM	BER:	19183 Rev "B" All I	Revision B change	s bold italics	
Туре с	of Proble	em: 🔀 Part B7122	-145 🗌 Pr	ocedure	Date: 10/17/2003
Who f	ound Pr	roblem: 🔲 ÁV	Supplier	Distributor	Customer
			— ,,		
Comp	any: <u>E</u>	Exelon - Dresden Plant	Cont	act Name: Paul Chene	li, Amir Shahkarami
Addre	:ss:		Phor	ie:	Fax:
	-				
1.	Team V	Vorking on Problem: Le	eader: D.S. Swinton	M	lembers:
	Kevin A	Armstrong. 1 Tom Troy,	Yanhua Yang		
2.	Descrit	be Problem (Initial Concern	n and Symptoms):		
	00 10/1	6/2003 Paul Chenell of Dre	sden reported that a B/	122-145, serial number 640)65 shipped on
	12/11/2	002, valve falled to exhaust	air win both sciencias (le-energized causing the C	RD valve to remain in the
	ohen hr	5511011.			
1	On 10/1	17/2003 the valve was delive	ared to Automatic Valve	by Amir Shahkarami for an	alvsis of the problem.
3.	Contair	n Symptom (Action):		-,	
	1.	Re-inspect all existing 691	0-001 plungers to verify	the correct overall length ('Done 10-17-03).
	2.	Rebuild, retest, and return	the B7122-145 valves t	o Dresden (Shipped 11-26	5 -03)
	3.	Notify customers potent	ially impacted, by Fax,	to inspect plunger lengtl	hs (10/24/03).
	4.	Inspect all units installed	d at Dresden station (c	ompleted 10-30-03, 15 of	274 plungers found out
	6	of specification)	d at Caspar station /or	meloiad 10 20 02 0 of 64	-
	υ.	snecification)	at Cooper Station (co	mpielea 10-29-05, 0 01 04	plungers lound out of
	6	Hold shipmont for all 69'	10-001 plupgars from	suspect let	

ent for all 6910-001 plungers from suspect lot

Approved by: Todd Hutchins 774 Title: CEO

Date: 12/15 /2003

12/16/2003 TUE 15:01 [TX/RX NO 9513] 2002

.

FAX NO. 248 474 6732

P. 03

AUTOMATIC VALVE TITLE: CORRECTIVE SUBJ: CORRECTIVE	ACTION ACTION	NUMBER: D7174-003 LOCN: I:\WORD\DOC TYPE: FORM	CUMENT\D7174003.DOC DEPT RESP: DOA	PAGE 2 OF 3 DATE: 10-21-1999 REV: F-CN8020	
				,	
4. Root Cause/s o The valve was fi pressure. The v position at 145 p pressure of appr	f Problem: rst functionally tested i alve functioned withou sig when both solenoi oximately 100 psig the	in the normal manner – It problems at low press ds were de-energized. a valve would fail to retu	10 CFR Part 21 Report Re that is at 35 psig low press ure but failed to return to it Further functional testing r m when de-energized.	equired: Yes ure & at 145 psig high s normally closed evealed that at an inlet	
When the valve exhaust port, wa +.005/003. Be material in tho p created a situati energized.	was disassembled, the is found to be approxin cause the plunger only lunger, due to a combi on where the plunger t	e plunger in the number nately .020 too long - 1 y has a total stroke of le nation of heat and pres nad no room to move ar	2 solenoid, the left hand s .315" compared to the spe ss than .030, the natural es sure, combined with the ou id thus exhaust pilot air wh	olenold when facing the clfied length of 1.290 kpansion of the seal it of specification length en the solenold was de-	
The root cause of Inspected prior	of the failure is the out • to use.	of spec plunger. Proce	edures require the length	s of all plungers to be	
Analysis of the lengths. Variation was t compressible r being categoria corrective actio	results of measuren raced to the use of d naterial with pressur- red as in specificatio on 5.1)	nent testing revealed a ifferent types of equip e sensitive measurem n initially and out of sp	n unexpected degree of ment and the inherent di ent devices. This may ha pecification at subsequer	variation in recorded fficulty in measuring ve lead to some units 1t inspection. (Refer to	
Notwithstandin changes to the is detectable a	g measurement varia length of the fluoroc nd beyond measuren	ation, the primary root arbon insert after it is nent uncertainty.	cause of the observed p pressed into the plunger	lunger dimensions is ^r body. This variation	
Dissection of re beyond specifi specification li	Dissection of returned plungers revealed abnormal compression set among all plungers which were beyond specification limits and normal compression set among plungers which were within specification limits.				
Chemical analy properties or n	Chemical analysis and durometer testing did not show any significant differences in the chemical properties or material hardness of the lot or in previous lots of identical insert material.				
However, the fo for 24 hours at	ollowing results were 230 degrees F:	obtained when plung	er insert samples were c	ompressed by 23 %	
Scenario			Average Set %	# tested	
Unused Inser	t, suspect lot, visible	set ,as received,	92	3	
Unused Inser	t, suspect lot, visible	set, post cured at 260	F 11	2	
Unused inser	t, previous lot no vis	ble set, as received	10	3	
Unused Inser	t,, suspect lot no visi	ble set, as received	9	2	
Field return in	isert, suspect lot ,vis	ible set	36	4	
Field return in	isert, suspect lot , no	VISIDIO SOL	10	<u>l_²</u> l	
From this we c takes place wh portion of the l	oncluded that there i en the solenoid is co ot was not properly p	s a cure problem with ontinuously energized. post cured.	a portion of the suspect Based on the test result	lot and that post cure s, we believe that a	
The degree of depends on ex Insert and the	growth of the plunge act dimensions of th exact cure duration v	r insert due to compre e molded insert when variation of the bad plu	ssion set is observed to installed, the ID of the pl inger inserts	be variable. This unger retaining the	
The degree of from the suspe study. Five plu detectably cha exhibited therr action 5.2, 5.3)	growth also seems to oct lot on hand) at Au ngers tosted at 200 c nge size when coole nal expansion and di	o be terminal. Returne tomatic Valve have no legroes F for five days d down. Ten plungers d not detectably chan	d plungers (field failure) of changed dimensions d exhibited thermal expan subjected to 230 degrees ge size when cooled dow	and other samples uring the period of sion and did not s F for ten days n. (Refer to corrective	

.

٠

AUTOMATIC VALVENUMBER: D7174-003PAGE 3 OF 3TITLE: CORRECTIVE ACTIONLOCN: I:\WORD\DOCUMENT\D7174003.DOCDATE: 10-21-19					
TITLE: CORRECTIVE ACTION LOCN: I:\WORD\DOCUMENT\D7174003.DOC DATE: 10-21-19					
	99				
SUBJ: CORRECTIVE ACTION TYPE: FORM DEPT RESP: DOA REV: F-CN8020					
Approved by: Todd Hutchins 774 Title: CEO Date: 12/15/2003					
5. Corrective Action:					
5.1) Specific individual measurement equipment is specified for plunger measurement.					
5.2) Specific lat definition based on curing process (as enposed to pre-vulganized rubber lat) to de	ina				
lot homogeneity for all number incorte	uiC				
5.3) A sample of each homogeneous processed sample to be tested for compression set as part of					
dedication process.					
Test Conducted to Verify It; Test samples to be placed under worst case temperature and pressure					
characteristics for a period of 10 months					
Approved by: Todd Hutchins TH Title: CEO Date: 12/15/2003					
Approved by: Todd Hutchins 774 Title: CEO Date: 12/15/2003					
Approved by: Todd Hutchins 77 Title: CEO Date: 12/15/2003					
Approved by: Todd Hutchins Trille: CEO Date: 12/15 /2003 6. Implementation (Describe: Include Applicable CN Numbers):					
Approved by: Todd Hutchins Trille: CEO Date: 12/15 /2003 6. Implementation (Describe: Include Applicable CN Numbers): CN 8897 defines lot and compression set and measurement characteristics for 6910-001 plungers.					
Approved by: Todd Hutchins TH Title: CEO Date: 12/15 /2003 6. Implementation (Describe: Include Applicable CN Numbers): CN 8897 defines lot and compression set and measurement characteristics for 6910-001 plungers.					
Approved by: Todd Hutchins アイ Title: CEO Date: 12/15 /2003 6. Implementation (Describe: Include Applicable CN Numbers): CN 8897 defines lot and compression set and measurement characteristics for 6910-001 plungers. Approved by: Todd Hutchins アイ・Title: CEO Date: 12/15 /2003					
Approved by: Todd Hutchins アイ Title: CEO Date: 12/15 /2003 6. Implementation (Describe: Include Applicable CN Numbers): CN 8897 defines lot and compression set and measurement characteristics for 6910-001 plungers. Approved by: Todd Hutchins アイ・Title: CEO Date: 12/15 /2003					
Approved by: Todd Hutchins TN Title: CEO Date: 12/15 /2003 6. Implementation (Describe: Include Applicable CN Numbers): CN 8897 defines lot and compression set and measurement characteristics for 6910-001 plungers. Approved by: Todd Hutchins TN · Title: CEO Date: 12/15 /2003 7. Corrective Action to System to Prevent Recurrence: Date: 12/15 /2003					
Approved by: Todd Hutchins TH Title: CEO Date: 12/15 /2003 6. Implementation (Describe: Include Applicable CN Numbers): CN 8897 defines lot and compression set and measurement characteristics for 6910-001 plungers. Approved by: Todd Hutchins TH · Title: CEO Date: 12/15 /2003 7. Corrective Action to System to Prevent Recurrence: To be determined. Todd Hutchins The set of the set					
Approved by: Todd Hutchins TN Title: CEO Date: 12/15 /2003 6. Implementation (Describe: Include Applicable CN Numbers): CN 8897 defines lot and compression set and measurement characteristics for 6910-001 plungers. Approved by: Todd Hutchins TN · Title: CEO Date: 12/15 /2003 7. Corrective Action to System to Prevent Recurrence: To be determined. Tode determined. Date: 12/15 /2003					
Approved by: Todd Hutchins TN Title: CEO Date: 12/15 /2003 6. Implementation (Describe: Include Applicable CN Numbers): CN 8897 defines lot and compression set and measurement characteristics for 6910-001 plungers. Approved by: Todd Hutchins TN Title: CEO Date: 12/15 /2003 7. Corrective Action to System to Prevent Recurrence: To be determined. Title: CEO Date:					
Approved by: Todd Hutchins TN Title: CEO Date: 12/15 /2003 6. Implementation (Describe: Include Applicable CN Numbers): CN 8897 defines lot and compression set and measurement characteristics for 6910-001 plungers. Approved by: Todd Hutchins TN · Title: CEO Date: 12/15 /2003 7. Corrective Action to System to Prevent Recurrence: To be determined. Title: CEO Date:					
Approved by: Todd Hutchins TH Title: CEO Date: 12/15 /2003 6. Implementation (Describe: Include Applicable CN Numbers): CN 8897 defines lot and compression set and measurement characteristics for 6910-001 plungers. Approved by: Todd Hutchins TH · Title: CEO Date: 12/15 /2003 7. Corrective Action to System to Prevent Recurrence: To be determined. Title: CEO Date: 8. Verification (Describe): Title: CEO Date:					
Approved by: Todd Hutchins TH Title: CEO Date: 12/15 /2003 6. Implementation (Describe: Include Applicable CN Numbers): CN 8897 defines lot and compression set and measurement characteristics for 6910-001 plungers. Approved by: Todd Hutchins TH · Title: CEO Date: 12/15 /2003 7. Corrective Action to System to Prevent Recurrence: To be determined. Title: CEO Date: 8. Verification (Describe): To be determined. Title: CEO Date:					
Approved by: Todd Hutchins 774 Title: CEO Date: 12/15 /2003 6. Implementation (Describe: Include Applicable CN Numbers): CN 8897 defines lot and compression set and measurement characteristics for 6910-001 plungers. Approved by: Todd Hutchins 774 ·Title: CEO Date: 12/15 /2003 7. Corrective Action to System to Prevent Recurrence: To be determined. Date: 12/15 /2003 8. Verification (Describe): To be determined. Title: CEO Date:					
Approved by: Todd Hutchins TH Title: CEO Date: 12/15 /2003 6. Implementation (Describe: Include Applicable CN Numbers): CN 8897 defines lot and compression set and measurement characteristics for 6910-001 plungers. Approved by: Todd Hutchins TH • Title: CEO Date: 12/15 /2003 7. Corrective Action to System to Prevent Recurrence: To be dotermined. Date: 12/15 /2003 8. Verification (Describe): To be determined. Title: CEO Date: 8. Verification (Describe): To be determined. Title: CEO Date:					

P. 04

- -

12/16/2003

U.S. Nuclear Regulatory Commission Operations Center Event Report

Page 1

General Information or Other (PAR)		Event #	40393
Rep Org: AUTOMATIC VALVE	Notificat	tion Date / Time: 12/16/2003	15:01 (EST)
Supplier: AUTOMATIC VALVE	Event Date / Time: 12/16/2003		(EST)
	La	st Modification: 12/16/2003	
Region: 3	Docket #:		
City:	Agreement State:	No	
County:	License #:		
State: MI			
NRC Notified by: TODD HUTCHINS	Notifications:	THOMAS KOZAK	R3
HQ Ops Officer: GERRY WAIG		PHIL HARRELL	R4
Emergency Class: NON EMERGENCY		CHRISTOPHER CAHILL	R1
10 CFR Section:		SUSIE BLACK	NRR
21.21 UNSPECIFIED PARAGRAPH			

10 CFR 21.21 FAILURE OF SOLENOID OPERATED VALVE TO CLOSE AT ELEVATED AIR PRESSURE

The following is taken from a facsimile from Automatic Valve:

"Describe Problem (Initial Concern and Symptoms):

On 10/16/2003 Paul Chenell of Dresden reported that a B7122-145, serial number 64065 shipped on 12/11/2002, valve failed to exhaust air with both solenoids de-energized causing the CRD valve to remain in the open position.

"On 10/17/2003 the valve was delivered to Automatic Valve for analysis of the problem. Contain Symptom (Action): Re-inspect all existing 6910-001 plungers to verify the correct overall length (Done 10-17-03). Rebuild, retest, and return the B7122-145 valves to Dresden (Shipped 11-26-03).

Notify customers potentially impacted, by Fax, to inspect plunger lengths (10/24/03).

Inspect all units installed at Dresden station (completed 10-30-03, 15 of 274 plungers found out of specification) Inspect all units installed at Cooper station (completed 10-29-03, 0 of 64 plungers found out of specification) Hold shipment for all 6910-001 plungers from suspect lot.

"Root Cause/s of Problem: 10 CFR Part 21 Report Required: Yes

The valve was first functionally tested in the normal manner- that is at 35 psig low pressure & at 145 psig high pressure. The valve functioned without problems at low pressure but failed to return to its normally closed position at 145 psig when both solenoids were de-energized. Further functional testing revealed that at an inlet pressure of approximately 100 psig the valve would fail to return when de-energized.

"When the valve was disassembled, the plunger in the number 2 solenoid, the left hand solenoid when facing the exhaust port, was found to be approximately .020 too long - 1.315" compared to the specified length of 1.290 +.005/-.003. Because the plunger only has a total stroke of less than .030, the natural expansion of the seal material in the plunger, due to a combination of heat and pressure, combined with the out of specification length created a situation where the plunger had no room to move and thus exhaust pilot air when the solenoid was deenergized.

<u>12/16/2003</u>

U.S. Nuclear Regulatory Commission Operations Center Event Report

Page 2

General Information or Other (PAR)

Event # 40393

"The root cause of the failure is the out of spec plunger. Procedures require the lengths of all plungers to be inspected prior to use.

"Analysis of the results of measurement testing revealed an unexpected degree of variation In recorded lengths. Variation was traced to the use of different types of equipment and the inherent difficulty in measuring compressible material with pressure sensitive measurement devices. This may have lead to some units being categorized as In specification initially and out of specification at subsequent inspection. (Refer to corrective action 5.1).

"Notwithstanding measurement variation, the primary root cause of the observed plunger dimensions is changes to the length of the fluorocarbon insert after it is pressed into the plunger body. This variation is detectable and beyond measurement uncertainty.

"Dissection of returned plungers revealed abnormal compression set among all plungers which were beyond specification limits and normal compression set among plungers which were within specification limits.

"Chemical analysis and durometer testing did not show any significant differences In the chemical properties or material hardness of the lot or in previous lots of identical insert material.

"However, the following results were obtained when plunger insert samples were compressed by 23 for 24 hours at 230 degrees F:

"Scenario [Average Set %, # tested] Unused insert, suspect lot, visible set, as received [92%, 3] Unused insert, suspect lot, visible set, post cured at 260 F [11%, 2] Unused insert, previous lot no visible set, as received [10%, 3] Unused insert, suspect lot no visible set, as received [9%,, 2] Field return Insert, suspect lot, visible set [36%, 4] Field return Insert, suspect lot, no visible set [10%, 2]

"From this we concluded that there is a cure problem with a portion of the suspect lot and that post cure takes place when the solenoid is continuously energized. Based on the test results, we believe that a portion of the lot was not properly post cured.

"The degree of growth of the plunger insert due to compression set is observed to be variable. This depends on exact dimensions of the molded insert when installed, the ID of the plunger retaining the insert and the exact cure duration variation of the bad plunger inserts.

"The degree of growth also seems to be terminal. Returned plungers (field failure) and other samples from the suspect lot on hand) at Automatic Valve have not changed dimensions during the period of study. Five plungers tested at 200 degrees F for five days exhibited thermal expansion and did not detectably change size when cooled down. Ten plungers subjected to 230 degrees F for ten days exhibited thermal expansion and did not detectably change size when cooled down. (Refer to corrective action 5.2, 5.3)

5. Corrective Action:

5.1) Specific individual measurement equipment is specified for plunger measurement.

5.2) Specific lot definition based on curing process (as opposed to pre-vulcanized rubber lot) to define lot homogeneity for all plunger inserts

5.3) A sample of each homogeneous processed sample to be tested for compression set as part of dedication process.

Test Conducted to Verify It: Test samples to be placed under worst case temperature and pressure characteristics for a period of 10 months.

<u>12/16/2003</u>

1 2 · M ·

U.S. Nuclear Regulatory Commission Operations Center Event Report

Page 3

General Information or Other (PAR)	Event #	40393
 "6. Implementation (Describe: Include Applicable CN Numbers): CN 8897 defines lot and compression set and measurement characteristics for 6910-001 p 	lungers	
"7. Corrective Action to System to Prevent Recurrence: To be determined.		
"The following plants have components containing the suspected lots as follows:		
Nebraska Public Power - Cooper Station Exelon - Limerick, Peach Bottom, Quad Cities, Dresden"		

.

.

.

.