

Part 21 (PAR)

Event # 52212

Rep Org: FLOWSERVE		Notification Date / Time: 08/31/2016 16:00 (EDT)	
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Region: 1	Docket #:		
City: RALEIGH	Agreement State: Yes		
County:	License #:		
State: NC			
NRC Notified by: WADE SHEPHARD		Notifications: RAY POWELL	R1DO
HQ Ops Officer: MARK ABRAMOVITZ		JONATHAN BARTLEY	R2DO
Emergency Class: NON EMERGENCY		BILLY DICKSON	R3DO
10 CFR Section:		GREG WARNICK	R4DO
21.21(d)(3)(i) DEFECTS AND NONCOMPLIANCE		PART 21/50.55 REACTORS	EMAIL

PART 21 NOTIFICATION - FLOWSERVE SWING CHECK VALVES

The following is an excerpt of the part-21 notification:

"Susquehanna Nuclear reported two size 3 class 900 Anchor Darling swing check valves were not passing LLRT [local leak rate tests]. After disassembly there appeared to be wear between the hinge arm and seat ring of the valve body apparent on the hinge. The interference was not severe enough to stop hinge arm motion of the disk, but did affect ability of the valve to seal during LLRT."

Affected Serial Numbers: BQ752, BQ753, and BO809

Affected Sites: Ginna, Diablo Canyon, Brunswick, Davis Besse, Kewaunee, Conn Yankee, Monticello, Susquehanna, Framatome, Chin Shan, and Kuosheng

Engineering Evaluation 10CFR21 No. 91

POC: Wade Shephard: 919-832-0525

IE19
NRR

**Flow Control Division**

Anchor/Darling Valves

BWIP Valves

Edward Valves

Valtek Control Products

Worcester Valves

August 31st, 2016

US Nuclear Regulatory Commission
Document Control Desk
11545 Rockville Pike
Rockville, MD 20852-2746

Subject: PPL Susquehanna Nuclear – 3" class 900 Swing Check Valve Serial Numbers
BQ752, BQ753, and BO809 (10CFR21-91)

This is to notify the US Nuclear Regulatory Commission that, in accordance with the provisions of 10CFR Part 21, we have identified a potential issue and are submitting our evaluation of the event.

DESCRIPTION: PPL – Susquehanna Nuclear reported two size 3 class 900 Anchor Darling swing check valves were not passing LLRT. After disassembly there appeared to be wear between the hinge arm and seat ring of the valve body apparent on the hinge. The interference was not severe enough to stop hinge arm motion of the disk, but did affect ability of the valve to seal during LLRT.

SCOPE: Size 3 class 900 Anchor Darling Swing Check valves supplied by Flowserve, as well as spare hinge arms for this valve design. See attached table included with the evaluation for a list of applicable valves and spare hinge arms.

PROPOSED ACTION: Flowserve will revise hinge arm drawing to update the radius/diameter at the location of wear to increase clearance between the hinge and seat ring to avoid recurrence. Flowserve will notify the customers who have been supplied spare hinge arms (noted in the table) of the attached evaluation of the defect and will request that the hinge arms be returned to Flowserve for evaluation and/or replacement at no charge if they have not been installed, or verification by the customer that there has been no interference issue if the hinge arms are currently in service.

Please do not hesitate to contact me if you have any questions or require additional information.

Sincerely,

A handwritten signature in cursive script that reads "Wade Shephard".

Wade Shephard
Engineering Manager
Flowserve, Raleigh NC Operations

**Flow Control Division***Anchor/Darling Valves**BWIP Valves**Edward Valves**Valtek Control Products**Worcester Valves*August 31st, 2016**Engineering Evaluation 10CFR21 No. 91**

SUBJECT: PPL Susquehanna Nuclear – 3" class 900 Swing Check Valve Serial Numbers BQ752, BQ753, and BO809

DESCRIPTION: PPL – Susquehanna Nuclear reported two size 3 class 900 Anchor Darling swing check valves were not passing LLRT. After disassembly there appeared to be wear between the hinge arm and seat ring of the valve body apparent on the hinge. The interference was not severe enough to stop hinge arm motion of the disk, but did affect ability of the valve to seal during LLRT.

SCOPE: Size 3 class 900 Anchor Darling swing check valves supplied by Flowserve, as well as spare hinge arms for this valve design. See table below included with the evaluation for a list of applicable valves and spare hinge arms.

ROOT CAUSE: The Size 3 class 900 Anchor Darling swing check valve design has a tolerance stack-up issue wherein it is possible that a heavy cast hinge arm and a seat ring at the upper end of its diameter limit could have an interference through a portion of the hinge arm motion. This issue does not affect other size or pressure class Anchor Darling swing check valves.

POTENTIAL EFFECT: An interference between the hinge arm and seat ring could affect the ability of the swing check valve to operate freely by gravity through its full stroke and cause the valve to fail seat leakage testing (especially at low pressures).

EVALUATION: Swing check valves normally operate automatically reacting to fluid flow and gravity to travel through its stroke. Normally these check valves swing freely and seal against reverse flow. Interference between the hinge arm and seat ring could impede free movement through the stroke and affect the ability to create a good seal against the body seat. The evaluation will include previously supplied check valves of this design along with spare hinge arm orders to verify order requirements in regards to valve operability, sealing requirements, and safety related function, if any.

CONCLUSION: A full review of previously supplied size 3 class 900 swing check valves has been done including a review of relevant PO and design specification requirements as to valve functionality. The table below shows the subject valve orders, the customer and site, and any relevant details required of the valves supplied to the customers. After the review it has been concluded that the possibility of the condition wherein there is a heavy cast surface on the hinge arm, causing possible interference with the seat ring and impeding the full sealing of the disk would not interfere with a safety related function or violate design specification requirements for any of these orders.

It has been determined that each valve was assembled and tested per relevant ASME code and specification requirements prior to leaving Flowserve's facility, including successfully passing seat leakage requirements of customer PO and/or design specification requirements. Since the valve pressure boundary is not in jeopardy, the valve would open as designed, and the valve

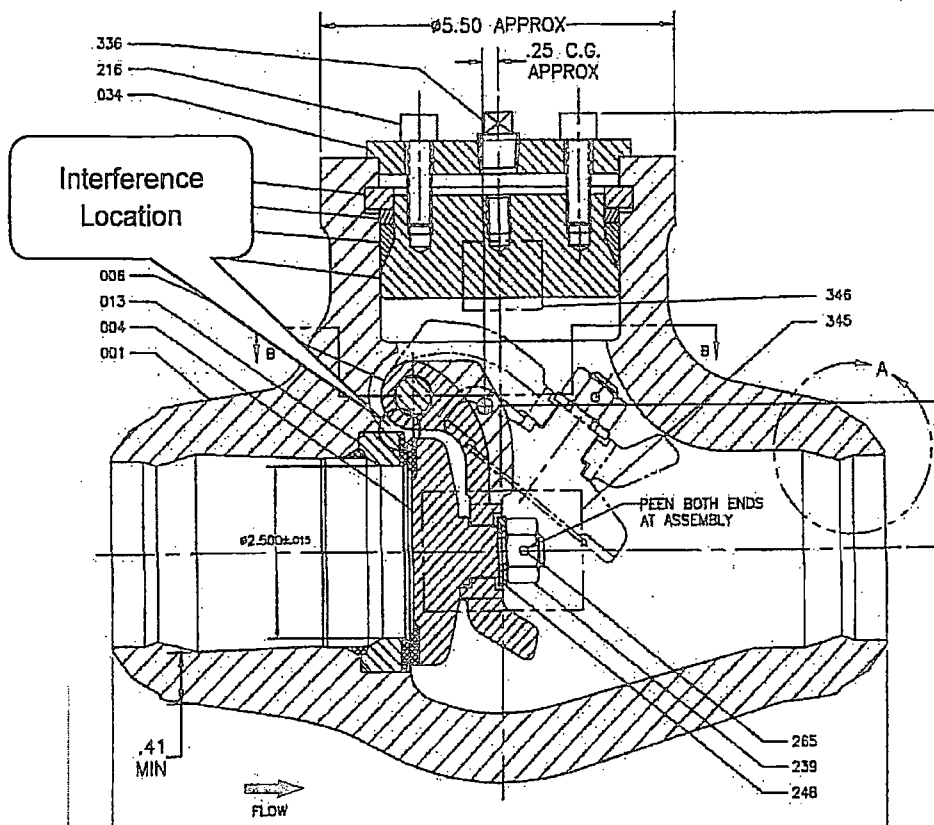
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would close with reverse flow to stop flow (but possibly not fully isolate in an LLRT situation, which this valve design is not ideal for), meeting code and spec requirements, Flowserve does not view this as a 10CFR21 issue for supplied valve assemblies.

For hinges supplied as spare parts, a similar review was performed. Since Flowserve did not install and test each of these hinge arms in the valves in our facility as the components were supplied as spare parts, Flowserve cannot guarantee there would not be interference between the hinge arm and seat ring that would cause a valve to fail to fully open or close as required by design (nor can we say with complete certainty the system into which these arms were installed at the site). While the sites installing these hinge arms should be performing a functional test to open and close the hinge arm assembly after installation into a valve at which time any interference would be visually apparent, Flowserve does not have the individual sites installation procedures and cannot therefore guarantee that a functional check is occurring. It is for this reason that Flowserve's position is that this is a reportable 10CFR21 issue in the case of supplied spare hinge arm assemblies for previously supplied size 3 class 900 swing check valves.



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QTY	SO	DRAWING	CODE CL	UTILITY	SITE	Delivery	Design Spec	Spec/Order Requirements
1	23798/E794T	W0326084	2	RG&E	Ginna	Aug-'03	*See Note	*No Spec per QAP/DWG/Des. Rpt. (Less N). QAP: Air Test
5	25745	W8722515	2	PG&E	Diablo Canyon	Nov-'03	8179 Rev. 2N	No operating requirements. 5.1.3(a2) specs safety related parts including seat, hinge and 10CFR21 applies. QAP: Cycle test 3 times - no binding.
2	43717	W8722515	2	PG&E	Diablo Canyon	Feb-'08	8179 Rev. 2N	Above. QAP: Cycle test 3 times - no binding.
2	82611	12-82611-01	2	Duke	Brunswick	Mar-'15	248-005 Rev. 8	No operational requirements.
4	103569	13-103569-01	2	PPL	SSES	Feb-'14	M-1371 R1, TSC No. 13	Spec 3.1.1, pass full rated flow and automatically close to prevent flow in the reverse direction, close by gravity alone test. 3.1.9.4 Fully open at flow rate specified. QAP: Stroke 12 times.
1	112699	15-112699-009	3	First Energy	Davis Besse	Dec-'15	M-212Q Rev. 5	No operational requirements.
1	116438	12-82611-01	2	Duke	Brunswick	Aug-'16	248-005 Rev. 8	See Above.
5	22525/E720T	W0226050	1 Less N	Dominion	Kewaunee		KNPP 02-03 Rev. 1	Prevent reverse flow. Request flow data for start, full open.
2	47240	W0226050	1 Less N	Dominion	Kewaunee	May-08	KNPP 02-03 Rev. 1	See Above.
1	60394	W0226050	1 Less N	Dominion	Kewaunee	Feb-11	KNPP 02-03 Rev. 1	See Above.
1	62116	W0226050	1 Less N	Dominion	Kewaunee	Jul-11	KNPP 02-03 Rev. 1	See Above.
2	69207	03-90669-01	2 Less N	TPC-Union Yield	Chin Shan	Feb-13	Ebasco TPC-9891.1035 R6	No operation requirements.
4	90669	03-90669-01	2 Less N	TPC-Union Yield	Chin Shan	Sep-03	Ebasco TPC-9891.1035 R6	See Above.
2	E9828	W8221485	2	TPC	Kuosheng	Feb-82	9713-M-35 Add 6	Add 7: No operating requirements. 4.12.8-B test for smooth operation.
6	E6871	W8722515	2	PG&E	Diablo Canyon	Feb-87	8179 R1	No operating requirements. 5.1.3(2) specs safety related parts including seat, hinge and 10CFR21 applies.

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1	EA797	W8822862	10CFR21	NSP	Monticello	Aug-88	85-17-3 (B16.34 valve)	R2: Not Available
1	EB738	W9023386	2	TPC	Kuosheng	Jan-91	9713-M-35 Add 7	See Above
1	ET836	W9424199	10CFR21	NEU	Conn Yankee	Feb-94	*B16.34 valve, no spec listed on dwg	SOI: No spec
2	E242A	W9725010	2	PPL	SSES	Nov-97	M-1371, R/O W/SCN #2, M1546 R0	Spec 3.1.3.3, pass flow with little resistance and prevent any reversal of flow, close by gravity test. M1546 not available. SOI: Stroke 12 times, Air Seat Test.
2	E242A	W9725010	2	PPL	SSES	Jan-98	M-1371, R/O W/SCN #2, M1546 R0	See Above
1	E686A	W9925212	3	Framatome	Technologies	Jan-99	08-5002283-00 R0	No operating requirements.
1	PE526 (Wmspt)	W8722515	2	PG&E	Diablo Canyon		8179 Rev. 2N	See Above.
1	31722	W9725010	2	PPL	SSES	Mar-05	M-1371 R1, TSC No. 13	See Above.
2	49047	W8722515	2	PG&E	Diablo Canyon	Aug-08	8179 Rev. 2N	See Above.
1	103266	W9725010	2	PPL	SSES	Nov-13	M-1371 R1, TSC No. 13	See Above.

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