

Part 21 (PAR)

Event # 50811

<b>Rep Org:</b> WEIR VALVES & CONTROLS USA, INC.		<b>Notification Date / Time:</b> 02/11/2015 14:52 (EST)	
<b>Supplier:</b> WEIR VALVES & CONTROLS USA, INC.		<b>Event Date / Time:</b> 02/10/2015 (EST)	
<b>Last Modification:</b> 02/11/2015			
<b>Region:</b> 1	<b>Docket #:</b>		
<b>City:</b> IPSWICH	<b>Agreement State:</b> Yes		
<b>County:</b>	<b>License #:</b>		
<b>State:</b> MA			
<b>NRC Notified by:</b> ARTHUR C. BUTTERS		<b>Notifications:</b> RAY POWELL	R1DO
<b>HQ Ops Officer:</b> JEFF HERRERA		PART 21 GROUP	EMAIL
<b>Emergency Class:</b> NON EMERGENCY			
<b>10 CFR Section:</b>			
21.21(d)(3)(i) DEFECTS AND NONCOMPLIANCE			

## PART 21 REPORT - WEIR VALVES AND CONTROLS SPLINE ADAPTER VIBRATED LOOSE

This report was received from Weir Valves & Controls via email:

During a walk down it was discovered that one of the spline adapters had slipped down the shaft of a TRICENTRIC valve supplied by Weir Valves & Controls, USA. This condition could have allowed the valve disc/stem to move from its normally open position to a partially closed or fully closed position. Weir Valve and Controls determined that the valve is designed with a single set screw tightened against the stem key and is susceptible to Human Performance Factors if it is not properly tightened against the shaft.

Name of Manufacturer:  
Weir Valves and Controls, USA

Affected Component:  
TRICENTRIC Triple Offset Valve

Affected Plant(s):  
Peach Bottom Atomic Power Station

\*\*\*\*\*

IE19  
NRR

**Weir Valves & Controls USA Inc.**

Excellent  
Engineering  
Solutions

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February 10, 2015

NRC's Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

RE: Peach Bottom HV-2-10-23453C Spline Adapters Vibrated Loose – 11/24/14

Dear Sir or Madam;

During a walk down of the Residual Heat Removal (RHR) Cross Tie Lines at Peach Bottom Atomic Power Station (PBAPS), it was discovered that one of the spline adapters had slipped down the shaft of a TRICENTRIC® Valve supplied by Weir Valves & Controls, USA. After this discovery, a review of all RHR and High Pressure Service Water (HPSW) TRICENTRIC® Triple Offset valves was conducted, and one additional valve was discovered to have a loose spline adapter.

Based on these valves needing to maintain a safety-related position of open, the spline adapter was evaluated to determine whether it was still engaged with the actuator. Based on the inspection, it was determined that the splines were not engaged. Weir Valves and Controls reviewed the torque curves for the unit, and determined that reasonable assurance cannot be provided for the valve maintaining open position as the expected hydrodynamic load and the friction loads were similar. Therefore, PBAPS and Weir Valves and Controls have determined that this instance needs to be reported under 10CFR Part 21.

In the application at PBAPS, this condition could have allowed the valve disc / stem to move from its normally open position to a partially or fully closed position. The deficient valve is a normally open, maintenance block valve for a newly installed RHR cross-tie motor operated valve that was installed to support Extended Power Uprate (EPU) operations. When this condition was discovered, the 'A' subsystem RHR motor operated cross-tie valve was closed and therefore, this discovered condition did not have any effect on RHR operation. The valve is oriented with a horizontal stem and the system was subject to normal flow induced vibration. During a design basis loss-of-coolant accident (LOCA) condition which involves opening the RHR cross-tie valve, an adverse impact on containment cooling could have occurred. Extent-of-Condition reviews at PBAPS identified a second similar butterfly valve in the HPSW system. The HPSW system could have been similarly affected during a design basis LOCA event. The HPSW manual valve has a vertical stem and was out-of-service when this condition was identified. Since one unit of both orientations was present and the vertical stem was not in operation, it would appear neither vibration nor position were the root-cause for the loose spline adapters. Weir Valve and Controls reviewed the design of the unit. The valve is designed with a single set screw tightened against the stem key. This is a relatively standard configuration for gear and motor operators; however the issue with this arrangement is susceptible to Human Performance Factors if it is not properly tightened against the shaft.

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Peach Bottom Atomic Power Station was able to verify the position of the actuator to the valve and reposition the spline adaptor in the valve. Peach Bottom installed a gag to keep the spline adapter on the valves from becoming loose again.

Weir Valves and Controls will be taking immediate steps to preclude this issue from occurring again. Steps will include:

- 1) Training for shop floor personnel on valves that require a set screw
- 2) Notice to our customers
- 3) WVC Engineering to develop a solution to reduce the potential for HPI factor to impede proper functioning of the valves.

Please feel free to contact me with any questions or comments.

Regards,

A handwritten signature in blue ink, appearing to read "A. C. Butters".

Arthur C. Butters  
Director of Engineering; Nuclear



**10 CFR PART 21 EVALUATION**  
Evaluation of Deviation or Potential Failure to Comply

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**Part 1: Identification of Concern and Preliminary Evaluation**

**1A** Identify the source of the information on the **deviation** or potential **failure to comply**:

Site Contacted Don Broschard about the fact that the Spline Adapters have been able to come loose and fall from the actuator. In addition Art Butters was contacted by the site.

**1B** Describe the **deviation** or potential **failure to comply** that has been discovered:

Current valve design allows the spline adapters in the actuator to fall out of actuator should the set screw loosen or lack of tightening during installation process. See attached customer complaint #634.

**1C** If the issue concerns ☒ a **potential failure to comply**, go to Section 1D ; ☐ a **deviation**, go to Section 1E

**1D** Does the potential failure to comply represent a violation of the Atomic Energy Act of 1954, as amended, or any applicable rule, regulation, order, or license of the NRC, including technical specification limits?

If **Yes** or **Uncertain**, check ☒ and complete Section 1E.

If **No**, check ☐ and complete Section 1F.

**1E(1)** Does the **deviation** affect the functionality of items or services provided by Weir Valves & Controls USA?

If **Yes** or **Uncertain**, check ☒ and complete Section 1E(2).

If **No**, check ☐ and complete Section 1F and Explain:

**1E(2)** Does the **deviation** involve a **basic component**?

If **Yes** or **Uncertain**, check ☒ and complete Section 1E(3).

If **No**, check ☐ and complete Section 1F and Explain:

**1E(3)** Has the **basic component** been delivered to a customer?

If **Yes** or **Uncertain**, check ☒ and complete Section 1E(4).

If **No**, check ☐ and complete Section 1F and Explain:

**1E(4)** Does the **basic component** deviate from the requirements of the customer's procurement document?

If **Yes** or **Uncertain**, check ☒ and complete Section 1G.

If **No**, check ☐ and complete Section 1F and Explain:

**1F** The **deviation** or potential **failure to comply** is not reportable in accordance to 10CFR21.

\_\_\_\_\_  
Originator (signature)

\_\_\_\_\_  
Originator (print)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Designated Responsible Officer (signature)

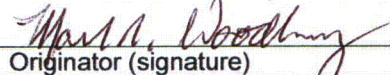
\_\_\_\_\_  
Designated Responsible Officer (print)

\_\_\_\_\_  
Date

*Have local Director, Quality Assurance retain this form on file for 5 years*

**Discovery**

**1G** The **deviation** or potential **failure to comply** warrants further **evaluation** in accordance with 10CFR21.

  
\_\_\_\_\_  
Originator (signature)

Mark Woodbury

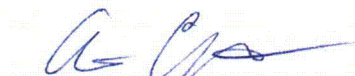
12/12/14

\_\_\_\_\_  
Originator (print)

\_\_\_\_\_  
Date

*Forward this form with relevant information to the Designated Responsible Officer.*

**1H** I have reviewed Part 1 and determined that the **deviation** or potential **failure to comply** should be evaluated based on the basis below for reportability in accordance with 10CFR21. (Start of 60-day clock)

  
\_\_\_\_\_  
Designated Responsible Officer (signature)

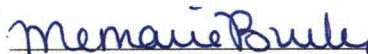
12/17/14

\_\_\_\_\_  
Date

Initial Due Date:

1/26/15

Within the 60-day clock started above, I will evaluate the **deviation** or potential **failure to comply** discovered in Part 1 to determine reportability in accordance with 10CFR21.

  
\_\_\_\_\_  
Cognizant Technical Engineer (signature)

12/17/14

\_\_\_\_\_  
Date



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Evaluation of Deviation or Potential Failure to Comply

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**Part 2: Technical Evaluation**

**2A** Identification of the company supplying the **basic component** or activity which contains a **deviation** or potential **failure to comply**:

Weir Valves and Controls

**2B** ☒ Confirm the information in Part 1. Note any discrepancies that need to be addressed:

**2C** Provide A) Technical Justification of Unit Acceptability; or B) Proposed Technical Solution

Based on a review of this VALVE, the design should be reconsidered. The typical methods of restraint for GOV and MOV TRICENTRICS® Spline Adapters are to reduce the opening in the adapter plate, use of a set screw, or use of a mechanical means above the shaft to keep the stem nut in position.

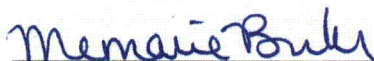
In this case, a set screw was used, however Weir feels the set screw backed off (to be confirmed at the next outage.) Weir's OPEX has shown no other instances of this occurring when assembled with the correct components. Since the VALVES were not taken apart, Weir can not confirm the proper parts were used nor if they were properly installed. However, based on the report that one of the lines was still blocked there should not have been significant enough vibration to cause a properly installed set screw to vibrate loose. Therefore, the conclusion is HPI leading to improper installation.

Weir has long considered the set screw the least desirable of the three approaches, as it relies most heavily on Human Performance and is therefore the least repeatable method. However, a method to avoid the set screw in all configurations has never been successfully developed.

Based on OPEX, Weir believes this issue relates to poor Human Performance on this order.

As such, Weir will resolve the issue at Peach Bottom, send a Operating Notice to Industry, and develop a method to eliminate the use of set screws.

- ☒ This issue is reportable pursuant to 10CFR21.  
☐ This issue is not reportable pursuant to 10CFR21.  
☐ A decision on reportability cannot be made based on the available information.



Cognizant Technical Engineer (signature)

2/9/15

Date

*Review with the DRO within 5 days of completion*



Designated Responsible Officer (signature)

2/10/15

Date

*The DRO will finalize the reporting requirements and submit the reports to the NRC and any affected facilities within 30 days.*

**Part 3: Conclusion of Reportability Evaluation**



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**3A** Basis for decision:

Based on the standard use of this in many installations, Weir Valves and Controls has determined that there is a possibility this Human Performance Issue could be repeated by a site unknowingly.

Weir has a duty to ensure that sites have the proper steps to accomplish the design intent is known and being followed.

Weir will also review the design to determine if a singular solution can be developed that would encompass all Gear Operator and Motor to reduce or eliminate the potential for Human Performance Errors in the future.

**3B** Number and location of all affected components:

**3C** I have evaluated the information and technical assessment developed and

- ☒ This issue is reportable pursuant to 10CFR21.
- ☐ This issue is not reportable pursuant to 10CFR21.
- ☐ A decision on reportability cannot be made based on the available information.

Based on this determination, I will proceed with all proper notifications within the allowable timeframes.

Designated Responsible Officer (signature)

2/11/15

Date



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**Part 4: Action Plan** (Corrective action, party responsible, and schedule for action):

No.	Precursor No.	Action Item	Accountability			Completed	
			Responsible	Due	Acceptance Initial	Date	Initials
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							