

# SAFETY ALERT

Safety Alert No.: D99-RRV2015-SA-001

Rev 01

**Titan BX Pressure Relief Valve**

**Date:** August 7, 2015

**Subject:** Structural failure of a Titan Type BX pneumatically-operated pressure relief valve, and required inspection, system considerations, and recommended modification of such valves. This Safety Alert has been issued as a follow-up to NOV Product Information Bulletin (PIB) number D99-RRV2015-PIB-001, issued March 30, 2015.

**Product:** This alert applies to all Titan 'BX' pneumatically-actuated pressure relief valves, typically installed in mud pump systems.

#### **Affected**

**Assemblies:** All valve assembly part numbers for the Titan 'BX' are affected.

**Objective:** To notify owners/operators of a structural failure of a Titan 'BX' relief valve, and to advise owners/operators:

- (1) of the necessity to visually inspect Titan 'BX' relief valves in service daily for evidence of leakage;
- (2) of NOV-recommended modifications,
- (3) of programming considerations for Titan 'BX' valve controls; and
- (4) of the necessity to design and maintain discharge piping so as to avoid impeding or obstructing mud flow when the valve opens.

**Operation:** The Titan 'BX' relief valve is held in the closed position by a compressed air supply acting on the actuator piston. (See Figure 1.) The 'BX' control system monitors the pressure signal from a transducer mounted near the mud pumps. Prior to service, the operator uses the 'BX' control system to set the relief pressure ("set pressure") and the time delay (if any) between detection that the set pressure is reached and opening the relief valve. When the programmed set pressure is reached and the delay setting elapsed, the control system opens a

solenoid valve that bleeds the air supply to the actuator, and the actuator springs move the valve piston to open the valve.

Mud pressure is much higher than the compressed air pressure in the actuator. It is essential that the mud pressure not be applied to the actuator cap, and the design includes safeguards to prevent that. If the valve piston seal fails to exclude mud from the actuator housing, a pressure vent is provided by the large slot in the actuator neck where the indicator pin travels. In addition, valves manufactured or modified since April, 2015 have four 0.250-inch vent holes in the valve body to relieve pressure. (See Figure 1.) If any mud pressure bypasses all of these safety vents, it would act on the actuator piston to open the valve.

**Solution:** NOV recommends that owners/operators of Titan 'BX' relief valve take the following precautions:

### **1. Visual inspection for valve piston seal leakage**

The Titan BX relief valve should be visually inspected every day of operation for external evidence of leakage of mud past the upper seals on the valve piston. If leakage of drilling fluid is observed, immediate action must be taken to repair or replace the valve and eliminate the leak.

Specific locations to monitor for leakage of the upper piston seal are shown in Figure 1:

- a) For all Titan BX valves, leakage of drilling fluid from the slot for the position indicator pin indicates leakage of the valve piston upper seal.
- b) Titan BX valves manufactured after April 1, 2015 have four ports located just below the bonnet flange to improve venting of fluid and pressure that leaks past the valve piston upper seal.

### **2. Modification to safely vent valve piston seal leakage**

NOV recommends that owners of existing Titan BX valves manufactured prior to April 1, 2015 contact NOV to have the vent ports added. The vent ports are shown in Figure 1 and described above in part 1.b).

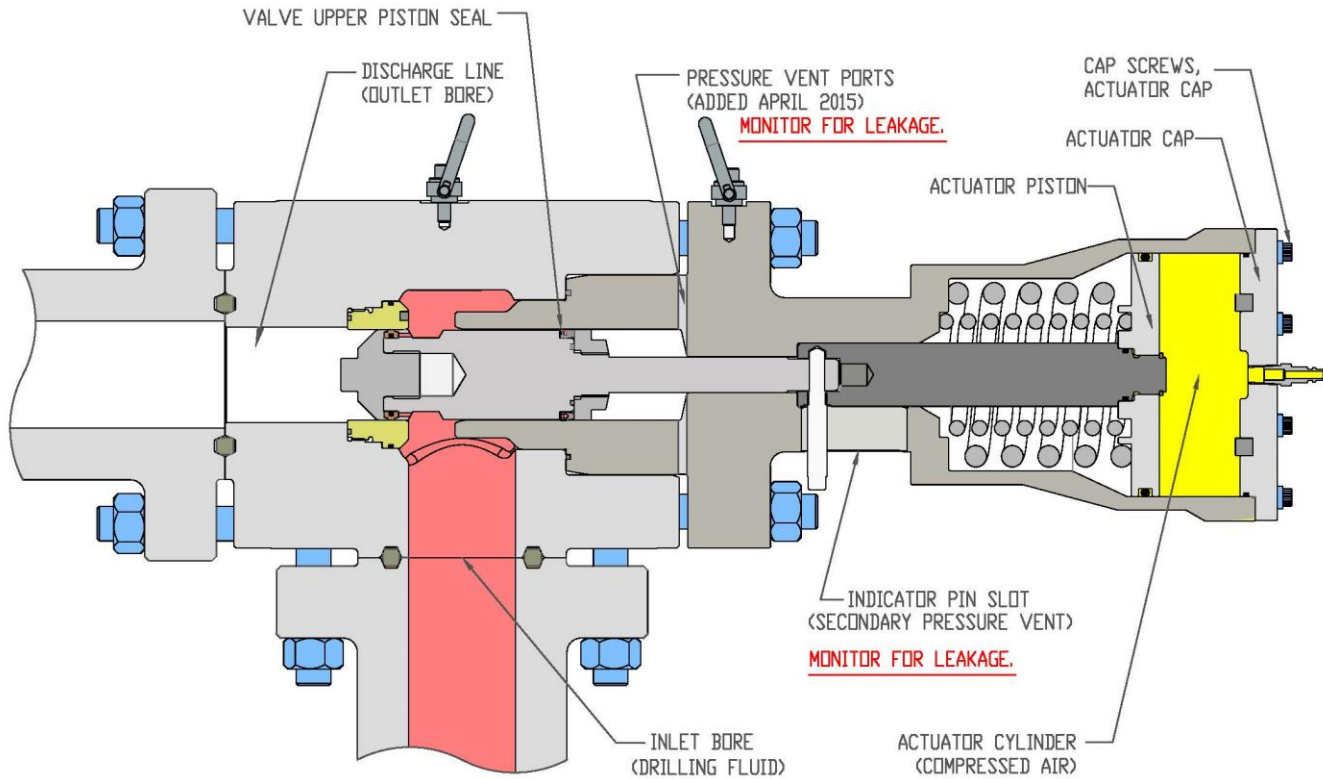
### **3. Consideration of fluid dynamics**

When entering the control system settings, owners/operators should consider how the fluid dynamics of the mud pump system could affect the pressure distribution in the components and the response time of the relief valve. Initial settings for trip pressure and trip delay time should be as low as possible, and increased only if the valve relieves more often than deemed necessary for safe operation. (It is possible to set the trip delay at 0.1 second, or even at zero.)

### **4. Discharge line piping**

The Titan 'BX' operating manual includes recommendations for the design of piping installed on the discharge line. It is important that flow from the valve be unobstructed to prevent any back-pressure from acting on the valve piston. Discharge piping must be inspected and maintained to be clear at all times.

**Figure 1: Titan BX Valve and Actuator:**



Owners/Operators should also refer to previous NOV Product Information Bulletins and Safety Alerts for additional information related to this issue and information regarding safe operation, maintenance, and inspection criteria by signing in to your MYNOV account at <https://portal.mynov.com> and then searching with the Product Bulletin Search available below the heading 'Application Groups'. For information on registering, please visit <https://www.nov.com/Search/register.aspx>.

**Failure to follow the recommendations and/or guidance in NOV Manuals and Product Bulletins may result in death, bodily injury or property damage.**

Please contact your local National Oilwell Varco (NOV) Service Center for price and availability or if you have any questions regarding this safety alert.