



SAFETY ALERT - #14-2009

BALL VALVE IN RELIEF LINE OVER PRESSURED

RELEASE DATE: JUNE 1, 2009

Function: Drilling Operations	Incident Date: June 6, 2008
Incident Type: Equipment Failure	Country and Region: Western Canada

Summary:

A brass ball valve in a pressure relief system failed after it was over pressured.

Description of Incident:

During normal drilling operations, the drilling mud motor stalled out. The sudden increase in pressure from the stalled out motor caused the pop valve on the pump to release. With the surge of pressure from the stalled out mud motor, a brass ball valve downstream of the pop valve on the bleeder line blew off of the line. There were no injuries sustained in the incident, but the potential risk was high.

The investigation found that the pop valve was set to relieve at 20,685 kPa (3000 psi). Both the pop valve and the bleeder valve were rated for 20,685 kPa (3000 psi). The 3 inch bleeder line terminates open ended into the mud tank; there was a 2 inch brass ball valve downstream of these valves. The purpose of this valve is to blow out the line downstream of the pop valve during winter operations to prevent freeze up and for pumping out the liner wash box.

Further investigation confirmed the following:

1. **Equipment Pressure Ratings:** All the components of pressure piping system did not meet the maximum pressure rating. In this case, the ball valve that failed was rated for 1725 kPa (250 psi) and was incorporated into a 20,685 kPa (3000 psi) system. Even though the bleed off system is open ended into the mud tank, a sudden surge of pressure, along with the column of fluid in the system, pressures can easily exceed 1725 kPa (250 psi). Surge pressures close to the rating of the pop off valve are possible until the system is bled off.
2. **System Design:** The pop valve and bleed off line is 3 inches and the high pressure hose from the outside of the building leading to the high pressure hose is 3 inch steel line; going into the tank is 2 inches in diameter. This reduction in diameter will cause an increase in the pressure in the bleed-off line. It is critical not to create any bottlenecks in a pressure relief system. Manufacturer's specifications normally require all piping downstream of the relief valve to be equal size or greater in size than the outlet of that relief valve.
3. **Material Specifications:** The brass valve incorporated into the bleed off system had gone unnoticed during previous inspections. The brass valve was the original valve direct from the manufacturer. Brass fittings were not appropriate for this application.

These issues are highlighted in the photographs on the following page.

Recommendations for Preventing Future Incidents:

Based on the findings from this incident, the following recommendations were identified for preventing future equipment failures:

1. All piping-hosing and valves materials must be suitable for the application and consistent with the pressure rating of the system in which they are installed.
2. Maintain consistent diameter piping in a relief pressure system; do not swage down piping in the system.

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Above is a photo of the failed 250 psi valve. This valve was replaced with the appropriate 3000 psi valve



3 inch bleed off line swages down to a 2 inch hose. The 2 inch hose was replaced with a 3 inch hose to eliminate the piping restriction.



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