SAFETY ALERT

Safety Alert No. 419
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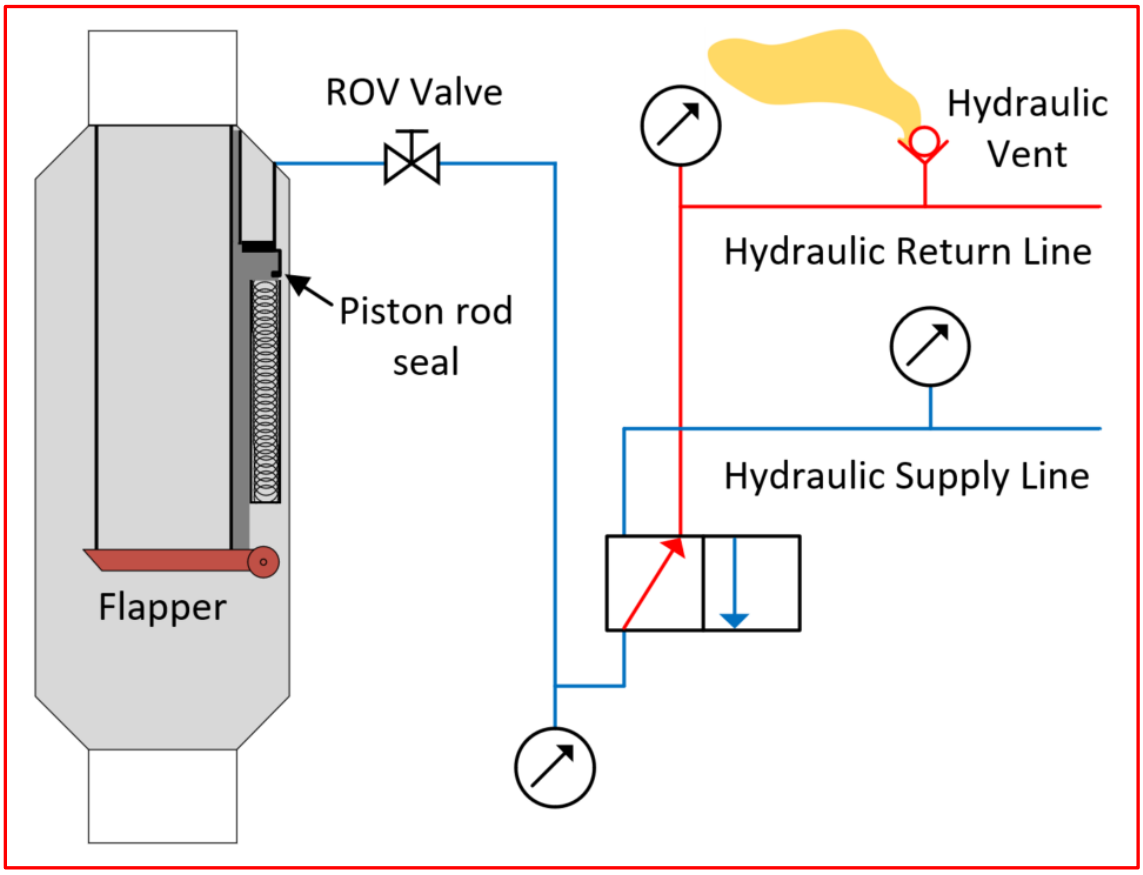
Failed Seal on Subsea Safety Valve Causes Leak



This is a simplified, not-to-scale drawing of the SCSSV (left) and the hydraulic lines that actuate it. The failure of the seal allowed well and hydraulic fluids to flow through the return line even though the SCSSV was closed.

While restarting after an Emergency Shut Down, operators on a floating production platform in the Gulf of Mexico noticed a loss of hydraulic fluid at one of their subsea wells. The loss was observed as a drop in volume in the hydraulic reservoir. Shortly after this incident, the platform was evacuated due to an approaching hurricane.

Workers discovered later that the rod piston seals of the Surface Controlled Subsurface Safety Valve had failed, allowing oil and gas to enter the hydraulic lines and discharge through the hydraulic vent. An estimated three to 50 barrels of hydraulic fluid and oil were released into the Gulf of Mexico. The tubing pressure above the SCSSV was not bled down before the evacuation, which may have increased the discharge volume.

An ROV was used to take samples of the discharge fluid and close the valve on the subsea tree, which isolated the leak. The samples collected by the ROV confirmed that the discharged fluid contained both hydraulic fluid and hydrocarbons. Tests initiated by the operator revealed the SCSSV failed to open when hydraulic pressure was applied.

BSEE recommends that operators and contractors consider the following:

- Control room operators should watch for abnormal behavior in the hydraulic system, especially when opening or closing subsea valves. Abnormal behavior may include:
    - Low liquid level in the hydraulic reservoir.
    - Hydraulic pumps cycling more frequently than normal.
    - Valves with hydraulic actuation not responding when commanded (e.g. a fail-closed valve not opening when hydraulic pressure is applied).
    - Abnormal pressure in the hydraulic system.
- Configure process alarms to alert operators to abnormal changes in hydraulic pressure, reservoir volume or pump cycle frequency. Verify that existing process alarms have been configured correctly to detect these abnormal conditions.
- When responding to a leak on the rod piston of a subsea safety valve, maintain hydraulic pressure to the valve if possible. This should keep production fluids contained until the leak can be isolated from the vent.
- When evacuating a platform (e.g. due to an approaching hurricane), bleed down the tubing pressure of wells to sub-ambient (below hydrostatic pressure).

--BSEE--

A **Safety Alert** is a tool used by BSEE to inform the offshore oil and gas industry of the circumstances surrounding a potential safety issue. It also contains recommendations that could assist avoiding potential incidents on the Outer Continental Shelf.

Category: Subsea, Pollution