

Snubbing Unit Parted Pipe / Jack Relief Failure

SAFETY ALERT

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Enform

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Description of Incident

The incident occurred on a hydraulic snubbing unit, which is a unit designed to trip tubular and downhole assemblies into and out of wellbores under pressure at surface (see Figure 1). A snubbing crew on a gas well was performing work which consisted of snubbing a tubing string out of the hole under pressure.

The operator set both hydraulic jack reliefs, which are safety features designed to limit the lifting pull of the snubbing unit to a value lower than that of the parting strength of the least durable component of the assembly being run. They began to pull out of the hole as per standard procedure, alternating between the secondary annular blow.

After pulling approximately 200 metres (19 joints) of tubing out of the hole, the operator encountered a sudden release of wellbore pressure. The operator secured the control panel and both workers exited the upper snubbing basket. The operator and site supervisor then regained well control with the primary pipe rams. A preliminary inspection revealed that the joint of tubing sitting in the traveling heavy slips had parted above the upset (see Figure 2). The remaining pipe was closed in the primary rams.

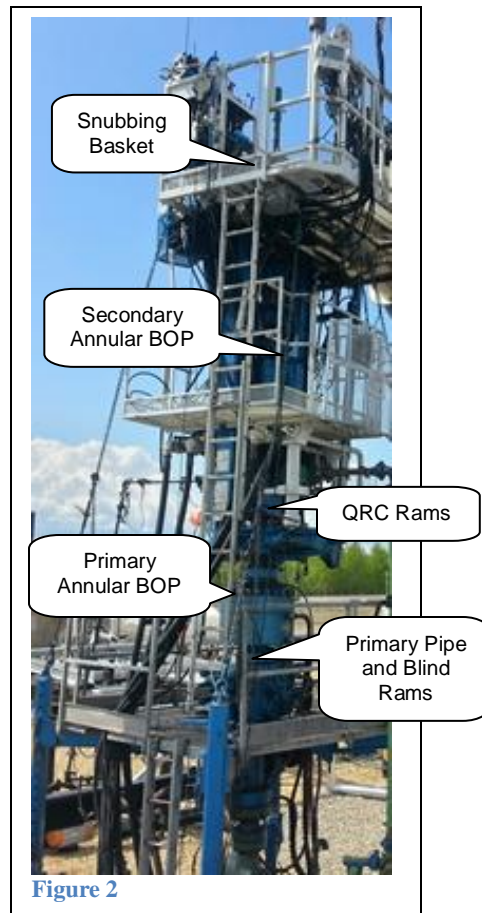


Figure 2



Figure 1

By industry, for industry

What Caused It

During high pressure operations it is mandatory for all tubing couplings to be staged out of the wellbore. During this process it is necessary for the operator to manually count strokes of the 3m hydraulic jack to ensure no couplings are unknowingly pulled into a closed ram or annular.

The conclusion of the investigation was that the operator had miscounted hydraulic jack strokes and pulled a coupling into the lower stripping QRC ram. At impact the force of the hydraulic jack parted the tubing string. The hydraulic jack reliefs are designed to relieve before the maximum tubing tensile strength is reached (in this case, 31.9 deca-newtons (DAN)) and this should have been sufficient to prevent the tubing parting. The jack reliefs were confirmed to be set at 28.5 DAN. It was discovered through testing that the relief setting was exceeded due to the momentum of the snubbing jack and hydraulic system inefficiencies (up to 35 DAN spikes).

This incident yields an important finding: that the jack relief system design alone is an insufficient control to maintain the exact force set by the operator during full throttle operation.

Corrective/Preventive Actions

Investigation provided the following recommendations:

- Given the severity of this incident and the potential for a more serious outcome, all operating companies that provide snubbing services are strongly encouraged to complete their own testing to determine if this hazard exists on their equipment.
- If this hazard is present, the manufacturer of the snubbing unit should be contacted and a plan developed to rectify the issue. The control for this hazard will vary depending on the design and configuration of the snubbing jack and its hydraulic makeup.
- All jack reliefs should be set to a maximum of 80% of the tubing tensile strength. If there is a need to exceed this setting, such action should first be approved by the operating company's management.