Yoke Failure on Snubbing Unit

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This document was developed by industry for industry. Working collaboratively, Enform works with the submitting organization representative in developing these documents to improve the industry's hazard awareness. Canada's leading oil and gas industry trade associations support the use of shared information to help companies of all sizes improve performance.

Details
Release Date: July 22, 2011
Incidence Type: High Potential Equipment Failure
Country and Region: Western Canada

For more information on this event, please contact: safety@enform.ca

Description of Incident:

A Rigless Snubbing Unit was preparing to stage the production tubing string into a well in Northern British Columbia, Canada. The average well bore pressure was recorded at 28MPa (4000 psi). At that pressure it is required to snub the tubing using the ram to ram staging method. As the snubbing operator was staging the coupler of joint #44 into the staging chamber of the snubbing unit the lower stripping Quick Ram Change (QRC) rams were closed, the chamber was de-pressurized, and the upper stripping QRC rams were opened. Immediately after the upper QRC rams were opened there was a natural gas release from the closed annular Blow Out Preventer (BOP) on top of the snubbing stack. The operator closed the upper QRC rams and investigated the cause of the release.

It was then noticed that the lower stripping QRC rams had malfunctioned and did not close properly due to a failure in the operating yoke of the QRC stripping ram breaking on the left side, making it impossible to apply the correct closing pressure to the QRC stripping pipe ram to achieve a seal on the tubing.

The tubing hanger was staged in using the upper stripping QRC rams and the damaged QRC rams were removed from the snubbing stack and sent for analysis of the failure.

Prior to commencing operations a safety meeting was held and a review of the company's ram to ram staging Job Safety Analysis (JSA) was completed. These actions were documented with all personnel on location.

What Caused It:

- The immediate cause of the incident was the failure of the operating yoke on the QRC.
- The original purchaser of the Rams had requested the manufacturer to modify the original equipment design to improve overall ease of handling, rigging in and rigging out of the BOP.
- The underlying causes of the failure included a faulty design from the manufacturer that did not account for the conditions the QRC was being used.
- A full management of change review was not conducted prior to the changes made to the equipment and assumptions were made about the strength and durability of the operating yoke and QRC.

Corrective/Preventive Actions

- The manufacturer has been instructed to issue recall notices when any design flaws are indentified and not to wait until customers bring equipment in for service or inspection. In this occurrence the manufacturer was aware of the design flaw and had been informing those customers of the flaw when they brought the QRC in for service and repairs.

Corrective/Preventive Actions (con'd):

- The manufacturer has been instructed to contact all customers who purchased the QRC's to inform them of the design flaw and remove all smaller faulty design yokes from service pending an engineering analysis on the new design.
- The snubbing company has 6 sets of the faulty QRCs and all were upgraded with new, heavier yokes. The yokes that were removed from service were sent for Non-Destructive Testing (NDT) and it was discovered that they were ALL cracked in the same spot.
- Snubbing operators are advised to add a visual inspection of BOP components to the supervisor's daily checklist.
- Snubbing operators are advised to utilize original equipment manufacturer (OEM) or an OEM approved vendor for BOP service and recertification.
- Enform the oil and gas safety association has been asked to send out a safety alert informing the industry of this high potential incident.
- The Petroleum Services Association of Canada (PSAC) has actively contacted all companies that purchased this BOP to ensure that the hazard is known.
- All companies that purchase manufacture equipment must not take for granted that all designs are flawless and to ensure that a Management of Change process is developed and followed when any changes are made to equipment or processes.

Additional Information:

- The BOP involved in the incident was 1.5 years into its 3 year certification and the inspection performed 1.5 years ago did not detect any damage or irregularities at the time of inspection.
- The certification was performed by a third party BOP recertification facility.

Further Reading and References

1. Industry Recommended Practice 15 Snubbing Operations 2nd Edition Published July 2007