

# SAFETY ALERT

## High potential incident – drill string ejected from hole

### INCIDENT

As part of a conventional well plug and abandonment operation the work string comprising a mill, 4 drill collars and 160m of 2 7/8" tubing was rapidly ejected from the hole along with 200m of fluid volume and an unknown quantity of gas. No one was injured during the event. The blow out preventer (BOP) blind rams operated as designed, and avoided escalation of the incident.

The incident occurred whilst milling a composite bridge plug at 200 MRT with an accumulation of gas under the plug. The blind rams were closed by the driller after the pipe was ejected from the hole and part of the fluid and gas was diverted via the choke to the poor-boy. The work string broke into four sections and landed forward of the rig. One section remained attached to the power swivel.

### CIRCUMSTANCES

The well design did not include a completion string and hence did not provide a conventional means of well killing or well bore isolation for the purposes of removal of the Xmas tree and installation of the BOP.

The well had internal integrity problems with full reservoir pressure in the production casing and production casing annulus prior to the commencement of well killing operations.

Although the well was successfully killed and monitored for flow for 18 hours prior to setting a wireline composite bridge plug using a lubricator on the Xmas tree, reservoir pressure accumulated under the plug after it was set and before the milling out of the plug (a 29 hour period).

The pressure equalisation feature of the plug operated too quickly, resulting in a piston force being applied to the bottom of the BHA that exceeded the work string weight (pipe light).

### INVESTIGATION

Influx pressure build up beneath the bridge plug was higher than predicted.

There was insufficient understanding of bridge plug pressure equalisation performance.

The shallow set bridge plug did not allow sufficient response time for the driller to safely manage the volume and intensity of kick he was presented with.

## RECOMMENDATIONS

A suspended well should be left with a kill string to facilitate conventional killing of the well as well as to enable isolation of the reservoir from surface when installing a BOP stack.

If for any reason (as was the case here) a relatively shallow plug must be used for well bore isolation then the possibility that full reservoir pressure accumulation beneath the plug must be planned for during milling operations and pressure equalisation performance of the bridge plug clearly understood. Such plans might include:

- The ability to hold down the string whilst milling (hold down capable rig)
- Drilling the plug with a closed BOP (annular preventer)
- The ability to circulate kill weight fluid above the plug
- The use of a CTU or snubbing unit (or snub assist)
- The use of a controlled pressure equalisation feature in the plug that ensures a controlled depressurisation before the slips are milled
- The use of sufficient BHA weight to ensure that no pipe-light situation could arise (Pipe light calculations should not only consider full reservoir pressure but also a dynamic case in which the pressure is effectively applied over the full bore diameter of the hole).

**NOTE:** Please ensure all relevant people in your organisation receive a copy of this Safety Alert, and are informed of its content and recommendations. This Safety Alert should be processed in a systematic manner through the mine's information and communication process. It should also be placed on the mine's notice board.

**Signed**



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