



SAFETY ALERT - #08-2009
CASING EROSION CAUSES UNCONTROLLED WELL RELEASE
RELEASE DATE: JUNE 15, 2009

Function: Well Completions and Servicing	Incident Date: April 10, 2009
Incident Type: Well Control Incident	Country and Region: NE British Columbia

Summary

An uncontrolled well release occurred after a hole was eroded in casing coupling during a high pressure fracturing operation.

Description of Incident:

During a high pressure fracturing operation in the Horn River Basin, communication to surface via the surface casing vent occurred. Shortly thereafter, an uncontrolled flow of water and sand began in the wellhead cellar area surrounding the surface casing. A breach of both the production casing and surface casing was suspected. The uncontrolled flow continued and was eventually diverted to a nearby borrow pit. Throughout the release, gas levels ranged from 10 – 90% LEL near the wellhead

Three days later, a retrievable bridge plug was successfully set below the suspected breach. A cement plug was added as a second barrier and flow was monitored. These barriers stopped the flow of water and gas. With the well secure, a downhole video was run which confirmed a hole in a 140 mm casing connection approximately three meters below ground level.

The source of this casing breach was determined to be erosion of the lower (up facing) casing pin in the first casing coupling below the casing hanger. Erosion was likely the result of turbulence, cavitation and high fluid velocity resulting from a combination of wellhead and casing geometry and very high pump rate. Significant erosion was also present in the lower portion of the tubing head. Casing connections below the eroded casing showed minimal erosion.

The nature of the surface casing breach is currently unknown, however, it is assumed to be also sourced from erosion or from over-pressuring.

Causal Analysis:

Contributing factors to the high erosion include:

- Design of the tubing head with casing ports machined into the bit guide bevel
- Relative location of the first casing connection
- Design of the connection at this depth (LTC - long thread and coupling)
- Well program design (high water rate, high water volume and high sand tonnage)

We Can Prevent Similar Incidents

Future design changes to prevent re-occurrence are under review. Considerations include:

- Use premium casing connection in place of LTC in the upper portion of casing string
- Current direction is to run premium connections deeper than the highest known cement top encountered in primary cementing operations
- Space out production casing to place first casing connection as deep as possible below the casing hanger to reduce flow disturbance at the first connection.
- Use a tubing head design which does not create excessive turbulence.
- Evaluate reducing stimulation pump rate.

Contact:

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DISCLAIMER:

This Safety Alert is designed to prevent similar incidents by communicating the information at the earliest possible opportunity. Accordingly, the information may change over time. It may be necessary to obtain updates from the source before relying upon the accuracy of the information contained herein. This material is



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