SAFETY ALERT - #09-2009
EXPLOSION IN FLARE SYSTEM WHILE SWABBING WELL
RELEASE DATE: APRIL 17, 2009

Function: Well Servicing Hazard Alert	**Incident Date:** August 28, 2008
Location: Onshore	**Location Detail:** Wellsite
Incident Type: Fire and Explosion Incident	**Country / Region:** Canada, West Central Alberta

Summary

While swabbing a well, enough oxygen was introduced to cause a flashback in the flare piping.

Description of Incident:

On a completions operation in the Grande Prairie area, a worker (test unit operator) was drawing a sample from the sample manifold at the P-tank (pressurized test vessel), when a flashback occurred. The resultant pressure release knocked him off his feet. Fortunately the worker was not injured and was able to close the sample valve and evacuate the area. The work was shut down at the site and an investigation of the circumstances which led to this incident was undertaken.

The investigation confirmed that a combustible air - fuel mixture was present in the P-tank. This explosive mixture flowed to flare under positive pressure and through a check valve at the base of the flare stack. When the air - fuel mixture reached the pilot at the top of the flare stack, it was ignited causing a flashback. The explosion was restricted to the flare line. Well personnel noted that after the incident the flare line near the stack was hot to the touch. The testing vessel and equipment were not damaged, upon inspection. The P-tank pressure safety valve still had its seal in place, confirming it did not release, however a bourdon tube in a pressure gauge was over-ranged and damaged.

Contributing Factors:

- Since the well was deviated, the swab cups had to be changed out approximately every six swabs. The incident took place after approximately 50 swabs. Air was introduced at the wellhead each time swab cups were replaced.
- The substance being swabbed, a drilling fluid called Aphron, was considered to be nonhazardous. However, propane was used to purge the P-tank and acted as the fuel source.
- Although purging the system was discussed at morning safety meetings, there was a lack of communication between the working groups on site as to who would do it and how often.

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Outcomes and Actions:

In addition to the development of this alert to industry the following has been undertaken:

- All three parties involved in this incident are reviewing and updated their swabbing / testing / purging procedures to accommodate for the lessons learned from this incident.
- To ensure this hazard is identified in all future operations, a documented check sheet should be added to the procedure which calls for gas testing, purging frequencies and timing to be recorded.

Conclusions:

Although this flash back incident was contained to the P-tank, the risk of a more serious incident resulting from this kind of operation is very real. It is recommended that companies who perform these types or similar types of operations review their work procedures and ensure that sufficient controls are in place to prevent the air - fuel mixtures from combining in a closed system.

Review, understanding and application of the principals of key regulatory and industry documents is essential to ensure the control of both well bore gas and support gas (propane) and the prevention of potential explosive mixtures. These documents include:

1. ERCB (Energy Resources Conservation Board) Directive 033 to "safely manage the potential for explosive mixtures and ignition as part of the overall well control, blow out prevention, and crew training procedures."
2. IRP (Industry Recommended Practice) 4 - Well Testing and Fluid Handling
3. IRP 18 – Fire and Explosion Hazard Management

When the potential exists for air to enter a closed system containing hydrocarbons a Fire and Explosion Plan Prevention should be prepared as recommended by IRP 18. The plan should include an assessment of the potential fire and explosion hazard and confirmation that the appropriate safety controls have been implemented as required for operations to proceed safely.

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