

Investigation Report
Worker fatally injured after well site explosion
October 23, 2018

The contents of this report

This document reports Occupational Health and Safety's investigation of a well site explosion which resulted in a work place fatality in October 2018. It begins with a short summary of what happened. The rest of the report covers this same information in greater detail.

Incident summary

Workers arrived at a well site to do maintenance and servicing of the well located at that site. The workers heard a loud hissing sound coming from the well fluids separator building followed by an explosion. The explosion resulted in one fatality and one worker taken to hospital.

Background information

Mojek Resources Inc. (Mojek) was established in 2014, with the head office located in Calgary, Alberta. Mojek is an oil and gas producer in Western Canada that deals with established well sites that are non-producing or produce low levels of product. Mojek's portfolio is comprised of approximately 38 500 leasehold acres.

Mojek owned the well site located at LSD 10-20-64-5W6 (102 Kakwa) near Grande Prairie, Alberta. On October 23, 2018, Mojek had one employee working on site, a contractor (1916577 Alberta Ltd.) when the incident occurred.

1916577 Alberta Ltd. was established on August 25, 2015, and was owned and operated by the contractor. This company provided well site operations and services in Northern Alberta. On May 1, 2018, Mojek hired 1916577 Alberta Ltd. to provide the operation and maintenance services on the well site located at LSD 10-20-64-5W6 (102 Kakwa), along with multiple other sites in and around the Grande Prairie area. On October 23, 2018, 1916577 Alberta Ltd. had two workers working at LSD 10-20-64-5W6 (102 Kakwa) along with the contractor.

The deceased worker (contractor) owned and operated 1916577 Alberta Ltd. since August 25, 2015, and had approximately 35 years of experience in the oil and gas industry. The contractor operated 1916577 Alberta Ltd. out of their home located in Fairview, Alberta.

Labourer 1 was hired by 1916577 Alberta Ltd. on approximately October 2 2018, and had previously been at LSD 10-20-64-5W6 with the contractor on September 26, 2018, for a service inspection. Labourer 1 had previously worked for the contractor in 2015, and had approximately 15 years' experience in the oil and gas industry.

Labourer 2 was hired by 1916577 Alberta Ltd. on October 22 2018, with the first day of work beginning on October 23, 2018. Labourer 2 had approximately 25 years' experience working in the oil and gas industry, but had no experience with this employer, prime contractor or well site.

Equipment and materials

Pumpjack sucker rod system and wellhead

The pumpjack made by EMSCO, was the overground drive for the reciprocating piston pump in the oil well. It was used to mechanically lift liquid out of the well if not enough bottom hole pressure existed for the liquid to flow all the way to the surface. The sucker rod system was a basic artificial lift system. The sucker rod pump made use of various components such as a beam, sucker rod, crank and other assemblies which worked together to provide a mechanical reciprocating motion. The wellhead was the unit at the surface of a well which was owned and operated by Mojek; it controlled pressure and connected to the drilling and production equipment (Figure 1).



Figure 1. The wellhead and pumpjack sucker rod system still intact post explosion.

A. The pumpjack sucker rod system.

B. The wellhead.

Pressure shutdown switch (pressure switch) and emergency shutdown device (ESD)

The pressure switch, manufactured by Presco, was a pressure-responsive flow control device which started or stopped the pump motor of the pump jack. The pressure switch also provided overall wellhead high and low pressure protection. The ESD shut in the oil or gas process system at the emergency shutdown valve and associated valve actuator when the system

experienced over pressure (Figure 2). Both of these devices were attached to the piping that was connected to the wellhead.



Figure 2. The pressure switch and ESD. Post incident showed that the pressure switch and the ESD were both engaged prior to incident occurring.

- A. The pressure indicator switch (Presco switch) safety button, located at the top of the device, was engaged. This button would pop up to indicate that the wellhead had experienced a high or low pressure.*
- B. The ESD in the shut in position.*

Pressure gauge

The pressure gauge (CPSV) was attached to the lower section of the wellhead. It indicated the amount of pressure down hole (Figure 3).



Figure 3. The pressure gauge needle was wrapped around the gauge and was sitting below the “0”. This was caused by a pressure, beyond the pressure gauge’s capacity of 300 pounds per square inch (psi), coming from down hole and through the piping that the pressure gauge was attached to.

A. The pressure gauge with the needle wrapped around.

Separator building location and base of separator tank

The Separator tank (vessel) was used to separate gas and liquid components from the fluids extracted from an oil well. The separator building was the structure built around the vessel. The explosion occurred within the separator building when the vessel ruptured (Figure 4).



Figure 4. The location of the separator building and remnants of its frame and the vessel were located in various pieces approximately 1000 metres (m) from the base. A manufacturer's identification placard from the vessel stated that Canadian Equipment Sales & Services Co. Ltd. manufactured the vessel on March 20, 1956 (Vessel No. 807) and was rated for a working pressure of 125 psi.

- A) The base of the vessel.
- B) Remnants of the separator building. Parts of the separator building were located in various locations from the separator building base up to 91 m away.

Sequence of events

On October 22, 2018, the contractor went to the well site located at LSD 10-20-64-5W6 (102 Kakwa) and engaged the pumpjack to build up pressure, as this was a low pressure well. The contractor then left site.

On October 23, 2018, at approximately 7:00 p.m., the contractor, labourer 1 and labourer 2 arrived at the well site located at LSD 10-20-64-5W6 (102 Kakwa). The contractor and labourer 1 were in the contractor's truck and labourer 2 was driving another truck. The contractor was training the two labourers on how to maintain and service that well site. The pumpjack was not operating when the workers arrived on site.

The contractor and labourer 1 checked the gauge on the wellhead which read "0" pressure. The contractor did not perform a functional ESD test on the Presco switch or visual check of the ESD when they arrived on site. The contractor directed labourer 1 to start changing out the elbow on the drain valve in the separator building, while the contractor showed labourer 2 how to engage the pumpjack. Labourer 2 got the pumpjack operating and was standing by the propane tank monitoring the pump jack. The contractor then assisted labourer 1 with changing the elbow on the drain valve in the separator building.

At approximately 7:15 p.m., the contractor was in the separator building and had directed labourer 2 to turn on the propane which was being used to push backpressure into the separator building. The contractor then directed labourer 1 to open the casing wing valve and 2 inch ball valve on the wellhead to build up pressure in the line to the ESD valve.

At approximately 7:20 p.m., the ESD safety system released from the pressure, allowing a rush of high pressured gas to be pushed into the separator building from the casing side of the well. Labourer 1 was standing by the ESD and labourer 2 was by the propane tank when they heard a loud hissing sound and saw gas coming out from the top of the separator building, where the contractor was still located. Both labourer 1 and 2 turned and started to run away from the well site when the explosion occurred. Labourer 1 was struck by shrapnel from the explosion and knocked unconscious.

When labourer 1 woke up, labourer 2 was standing over labourer 1 advising that the contractor was deceased. Labourer 1 got up and closed the wing valve and 2 inch ball valve, shut off the propane, shut the pumpjack off and called the vice president of Mojek. Labourer 2 called 911 and gave the location of incident and what had occurred.

Emergency medical services (EMS) and Royal Canadian Mounted Police (RCMP) arrived on site at approximately 7:50 p.m. Labourer 1 was transported to the hospital by EMS.

Final Report

Completion

A review for enforcement action was completed on November 19, 2019, and it was determined that prosecution or an administrative penalty were not appropriate based on the circumstances surrounding this incident.

This investigation was closed on October 27, 2020.

Final Report

Signatures

ORIGINAL REPORT SIGNED

August 14, 2020

Lead Investigator

Date

ORIGINAL REPORT SIGNED

October 26, 2020

Manager

Date

ORIGINAL REPORT SIGNED

October 27, 2020

Director

Date