

Topic: Summary of a Gas Gun Operation  
Operation: Workover to convert a suspended oil well to a water injection well.  
Area: Provost, Alberta, Canada  
Formation: Lloydminster (Lower Manville)  
Depth: 800.5 to 803.5 m KB (2,626.4 to 2,636.3 ft KB)  
Porosity: 30%  
Permeability: > 1 Darcy

#### Workover Summary:

This well is located in an area where the Lower Manville zones have very high porosity and permeability. When perforating in the water legs, the sand commonly sloughs in and requires a clean out to surface before any injection can be initiated.

The pool pressure has been depleted because the existing water injection well is not properly connected to the producing interval. A workover was required to convert this well to a water injection well in the water leg of the reservoir. At the beginning of the workover a cement squeeze was required in the oil leg of the Lloydminster zone and a Coal Bed Methane interval. Both cement squeeze operations appeared to be successful. Prior to the cement squeeze a feed rate of 1 m<sup>3</sup>/min at zero pressure was established in the Lloydminster oil zone.

After perforating the Lloydminster water zone it went on a vacuum. We tagged for sand and found none.

It was decided to do a casing scrapper run, set the packer and do an injection test. We could not set the packer due to cement on the casing and we could not establish a feed rate into the new perforations. A chisel operation was conducted to clean up the casing prior to dealing with the feed rate problem on the new perforations.

We did a pump to surface operation on the well in an attempt to clean out sand from near wellbore as a previous workover on a water injection well. The well swabbed off and no sand was brought to surface or tagged in the wellbore. It appeared to be a different problem than the previous well.

We decide to use the Gas Gun to get access to the reservoir. After firing the gun the well went on a vacuum. We pulled two swabs and the well started flowing water and gas. There was very little sand produced. The well was flowing due to the gas cap generated from depleting the reservoir without proper pressure maintenance. A feed rate of 0.6 m<sup>3</sup>/min at zero pressure was established after the gas gun. A higher rate could have been achieved but we were just using the rig pump and we were just doing the injection for the temperature log.

In summary the Gas Gun worked quite well. Post perforating, the zone had no feed rate and after using the Gas Gun we were getting 0.6 m<sup>3</sup>/min (3.8 bbls/min) at zero pressure. I was very pleased with the result and given a similar situation, I would use this gun again. I would be interested in a carrier that would perforate and set off the gas gun in the same run with a small delay.