

Case Study:

FloSure AICD improves heavy oil cold production in Western Canada

Taking a new look at heavy oil cold production strategies

Well Data

Location: Alberta, Canada

Reservoir Type: Heavy Oil/Extra Heavy Oil

Application: Cold Production, Water Drive

Well Design: Horizontal Wells, Retrofits

First Installation Date: July 2017



Background

This is a mature, brownfield play that has been developed for 30+ years. Wells in this area have a very high water cut, often above 99% for many years. The reservoir is supported by a strong water aquifer, so the pressure is high, but the oil/water mobility ratio keeps oil production low.

The Challenge

The operator requested a fit-for-purpose completion to be developed that would be economical in this challenging heavy oil environment. The goal was to reduce water production and increase oil rates with an AICD completion system for both new wells and retrofits.



AICD completion before deployment in heavy oil well

TAQA Solution

A horizontal completion can be segregated into stages (10-30 per well) by TAQA's low-temp, hybrid swellable packers, and each of these stages is controlled by AICD valves. Regardless of where the water is entering the wellbore (heel area, high-permeability streaks, swept zones, proximity to the oil-water-contact), each stage autonomously controls and limits the volume of water that can enter through the AICD. This allows for higher pressure drawdowns to be applied to the zones that are "drier", allowing for increased oil production and lower water volumes.

Economically speaking, advanced inflow control technology is often considered overly expensive for low-rate heavy oil wells with no thermal injection. However, a single AICD valve with low-cost sand screens and packers allowed us to design an open-hole AICD completion solution that was virtually cost neutral vs. a traditional cemented and perforated wellbore.

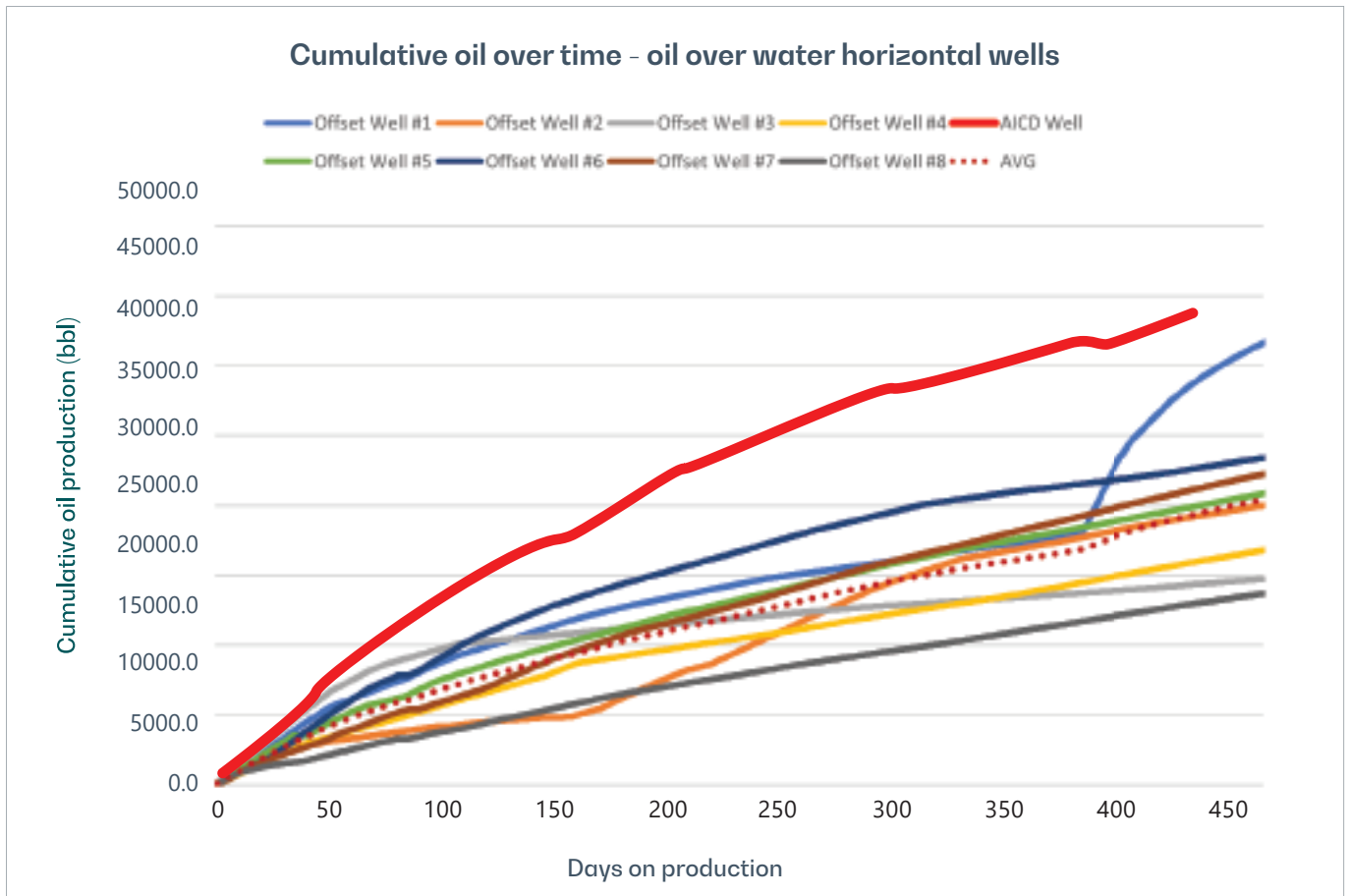
TAQA's new hybrid swell rubber compound was extensively tested to optimise its reaction in low temperature conditions. This advanced compound is activated by both oil and water, and has the fastest swell performance at temperatures as low as 30°C.

With more than a dozen AICD-completed wells now online, there is considerable evidence that these multi-stage AICD completions consistently control water cut and improve oil production. The onset of water is delayed, and it is limited, allowing for a more aggressive production strategy to accelerate recovery and improve the return on investment by up to 250%.

Project Results

Well designs were modified, and production strategies were tweaked to optimise deliverability, with the results being truly significant. Oil production is increased by 150-250%, and water volumes are reduced by 40-50%. The overall result is a return on investment that is improved by more than 250% per well, with a far lower risk of water problems.

- New wells are completed with 4-1/2" AICD screens and swellable packers
- Older wells are re-completed with 2-7/8" AICD subs and swellable packers
- PCP pump selection is optimised to produce wells with higher drawdown, lower total fluid volumes
- Reduced water production per well, allows more wells to be produced into surface facilities
- Wells can be drilled through depleted/swept zones in the reservoir and maintain productivity



240% higher oil recovery over 87 days using TAQA AICD