

## Case Study - 9

# World's first unconventional AICV® installation, restores oil production by 500% and reduces water production by 50%

The Bakken oil formation has long been synonymous with new technology and pioneering in the development of hydraulic fracturing for unconventional reservoirs. With rapid production declines and early onset of water production, many wells are shut-in long before their expected reserves are recovered. A novel through-tubing Autonomous Inflow Control Valve (AICV®) design was developed and tested as part of a multi-well field trial. The technology was deployed to evaluate new water-control technologies to help restore oil production to this important unconventional resource play.

## Challenges and Objectives

The existing well completion was a 4.5", multi-stage, cemented frac liner that had been shut-in due to high water production (99% WC). Several attempts had been made to identify and isolate the location of water production but were ineffective and cost prohibitive. While facing challenges such as low reservoir pressures, low oil production rates, and small pipe diameters, the deployment of the Autonomous Inflow Control Valve (AICV®) emerged as a promising solution to selectively choke back the water while improving oil rates.

## Solutions

The AICV® is proven to restrict and effectively manage water (and gas) production without the need for additional logging operations to identify the locations of water ingress. InflowControl collaborated with the operator to evaluate the completion design and production potential of the well. This collaboration led to the development of a fit-for-purpose AICV® through-tubing completion with swell packers to provide optimal zonal isolation for autonomous water control that creates a more effective drawdown regime on each individual frac cluster within the tight sandstone formation.

## Results

The workover operation was implemented as planned and the well was brought back onto production in early 2023. A tailored production optimization plan was designed for the wells to be "pumped-off" to levels that could not previously be achieved. By introducing additional drawdown through the AICVs, oil production was stimulated from previously un-swept zones, while zones with high water production were restricted significantly allowing higher recovery of net oil. The wells were brought back onto production with a 50% reduction in water production, from 370 BWPD to 185 BWPD. Oil production was restored from <5 BOPD to an average of 31 BOPD. By regulating water ingress, the well yielded a 500% increase in oil production. This was a significant return on investment for the operator given that the well that had previously been shut-in. Through this innovative workover, oil production was restored and the AICV® technology paid out in less than 120 days.

LOCATION  
North America

NUMBER OF WELLS  
1

OPERATOR  
Independent Operator

DEPLOYMENT  
Onshore

RESERVOIR  
Unconventional Bakken

COMPLETION  
2-3/8" AICV® through tubing retrofit  
inside 4-1/2" frac liner

## Results



**120 days**

Payback time



**500%**

Increased oil production



**50%**

Reduced water production



This unique project marks the first 2-3/8" AICV<sup>®</sup> retrofit completion system deployed inside 4-1/2" frac liner and is also the first AICV<sup>®</sup> completion specifically designed for unconventional wells with rod-pump artificial lift systems.

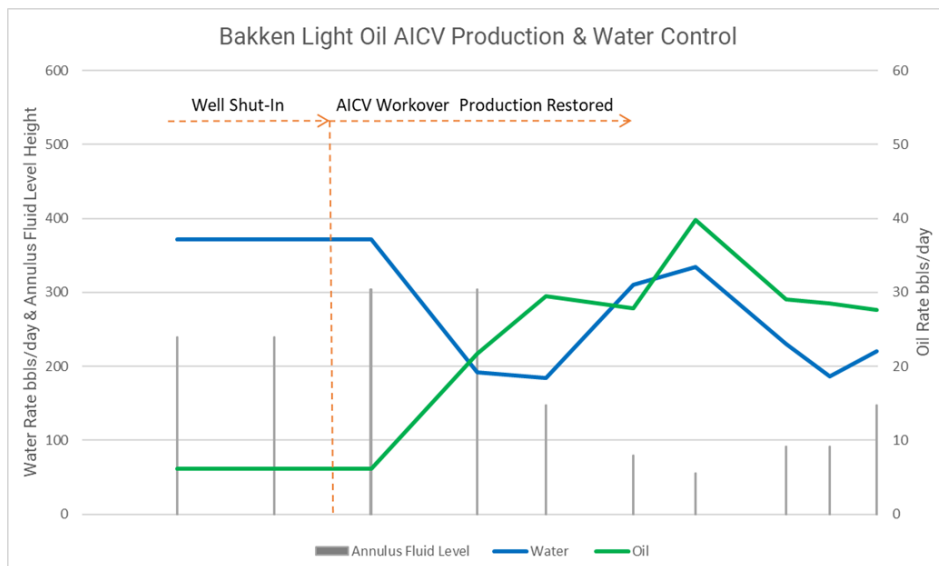


Figure 1. Bakken Field Trial Well #001. Production pre and post AICV<sup>®</sup> installation

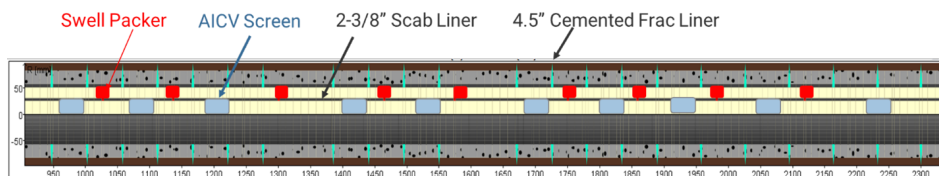


Figure 2. Bakken Field Trial Well #001. 10 zone AICV<sup>®</sup> retrofit lateral completion