

## Case Study:

# First wireless completion system deployed in the Bakken

Tendeka's PulseEight system proves the feasibility of a truly wireless intelligent completion.

### Well Data

**Location:** North Dakota, USA

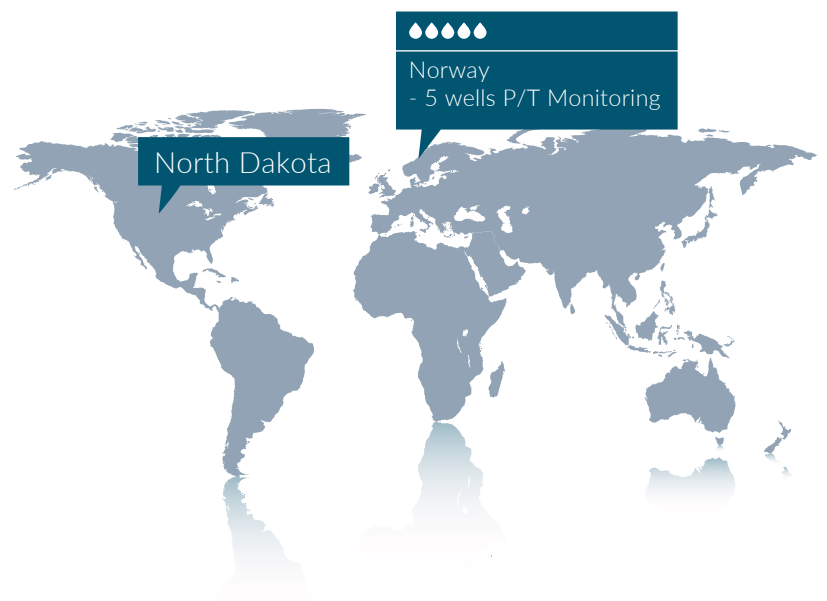
**Well Type:** Oil Producer - Shale

**Tubing Size:** 2 7/8"

**Fluid:** 1,500BOPD, 1,500BWPD,  
2MMscf/d, 45API

**Pressure:** 3,700psi

**Temperature:** 125 degC



### Project Overview

Tendeka's PulseEight Wireless Intelligent Completion system uses unique pressure pulse telemetry to channel wireless communication between a well's downhole monitoring and control system and the wellhead. Previously, Tendeka installed Wireless Pressure / Temperature gauges and so proved communication from the wellbore to the wellhead.

This relayed critical reservoir pressure and temperature data which the client used for depletion monitoring and for the planning of an infill drilling campaign.

To unlock the full potential of the system and allow for greater control, Tendeka embarked on a project to prove bi-directional communication via a PulseEight Interval Control Valve (ICV).

The device was required to send the Pressure / Temperature data up the well and pressure pulses sent down the well to communicate with the ICV in a multi-phase fluid environment.

An oil producing shale well in the Bakken was completed with a PulseEight system for a large overseas National Oil Company (NOC).

### Tendeka Solution

To prove the suitability of pressure pulse telemetry for communicating from surface to the downhole device, Tendeka assessed the many variables and how changes in these would affect the wireless signal detected. The wellhead choke was cycled several times to create the pressure pulses with varying pulse widths, amplitudes and pulse periods. Monitoring of the surface response provided indications of successful communication links whilst analysis of the data recorded by the device's memory showed the make-up of the pulses and if there was any signal distortion.

The device was deployed as part of the 2 7/8" completion and set at 7,000ft TVD. A shroud was used to house the device and provide bypass to a pump out sub below. The system was deployed through a snubbing unit and after blowing the pump out sub, the well was shut-in until the surface handling system was installed. Standard completion installation procedures were adhered to and due to the simplicity of the system there was no additional operational time.



## Project Results

After 5 months, the PulseEight device was retrieved from the well and the downhole data analysed. Results showed that all surface choke manipulations were successfully and clearly recorded by the device, as seen in the graph below. All pulses were detected with minimal losses whilst no distortion in the signal was evident.

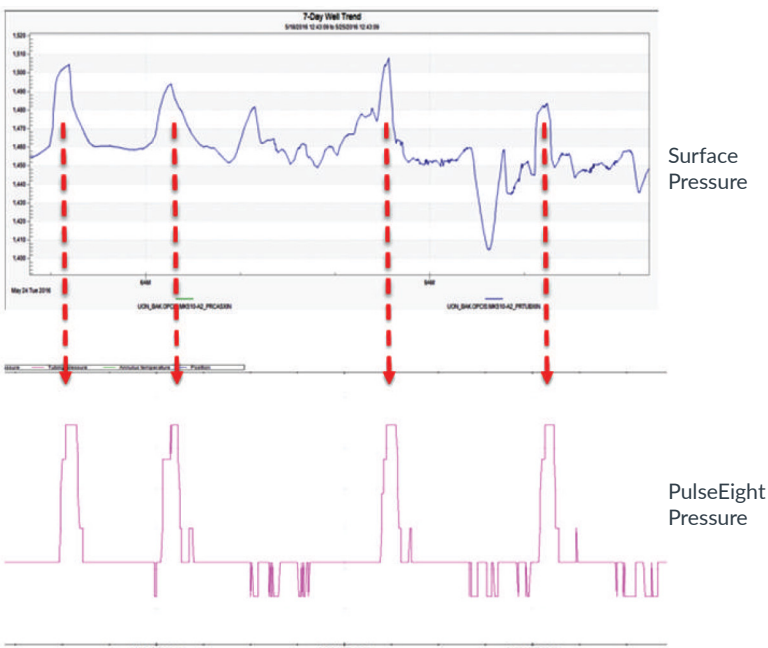
Pressure trends from the wellhead producer showed production was unstable and was regularly experiencing slugging. Also, a number of unplanned shut-downs occurred due to a newly installed surface system. None of these occurrences were inadvertently picked up by the PulseEight device and mistaken for pressure pulse commands, proving the system is suitable for multi-phase environments and unstable production regimes.

PulseEight Wireless Completion systems offer cost and HSE benefits over conventional cabled systems. Removing the requirement to run cables to surface reduces feed-through connections and potential leak paths, improving barrier integrity. Personnel time on site is minimised, reducing exposure to risks.

Tendeka can now offer a robust, field proven wireless completion system that can be used to bring greater flexibility to many applications.

### One tool, 8 applications:

- Pressure / Temperature Monitoring
- Interval Control
- Multi-lateral Well Control
- Water / Gas Shut-off
- Remote Barrier for Multi-stage Frac Applications
- Autonomous Gas-lift Optimisation
- Gas Hydrate Prevention
- Cross-flow Prevention



Four pressure pulses generated using surface choke modifications

