

Oil and Gas Development in Alberta

Overview of Exploration and Production Processes

PETROLEUM AND NATURAL GAS EXPLORATION AND PRODUCTION IN ALBERTA

In 2012, total marketable natural gas was 3.7 trillion cubic feet, and crude oil production averaged 556,300 barrels per day, contributing to more than \$2.8 billion to provincial revenues.

Of the 271 urban areas in Alberta, 19 per cent (52 areas) have producing wells within their boundaries. The majority wells are in towns and villages; there are relatively few producing wells within larger cities, 16 in Edmonton and 7 in Calgary.

HOW ARE CONVENTIONAL WELLS DRILLED?

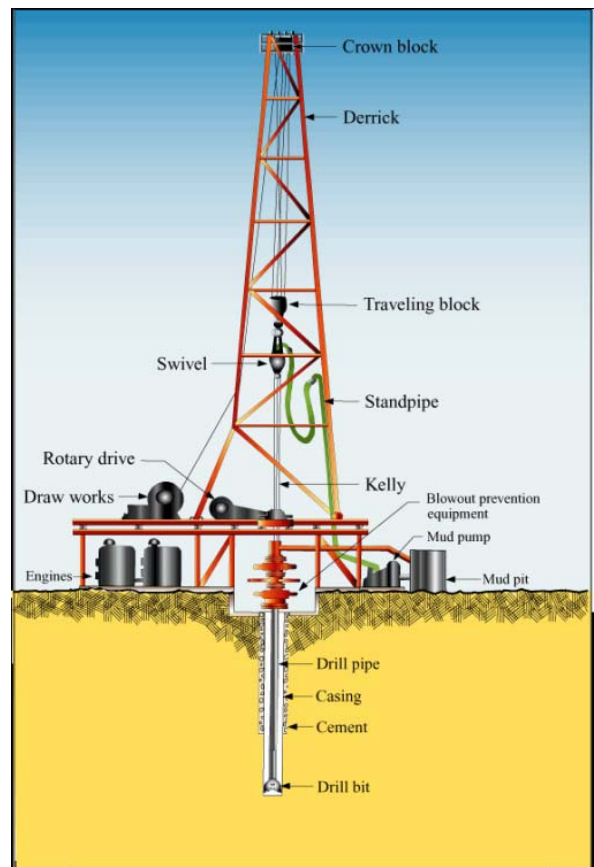
Drilling

The only way to determine whether a rock formation contains petroleum or natural gas is to drill a well. There are many different types of drilling rigs operating in Alberta. The general rule being the larger the rig, the deeper it can drill.

The drilling process is relatively simple (see Figure 1). A revolving steel bit grinds a hole through layers of rock. A fluid composed of chemicals, minerals and water (sometimes oil), is pumped down the drill pipe to lubricate the bit, remove cuttings, condition the well bore, and stabilizes the pressure to prevent blowouts.

The crew threads on sections of pipe as they drill deeper.

Figure 1: source (open source)



Drilling Stages

Exploration

Drilled in stages, the surface hole, or “spudding in”, is established, then the drill pipe is removed, and the surface casing is cemented - this controls the flow of fluid, and prevents contamination of groundwater aquifers. Blowout preventers are installed to stabilize pressure.

Completion

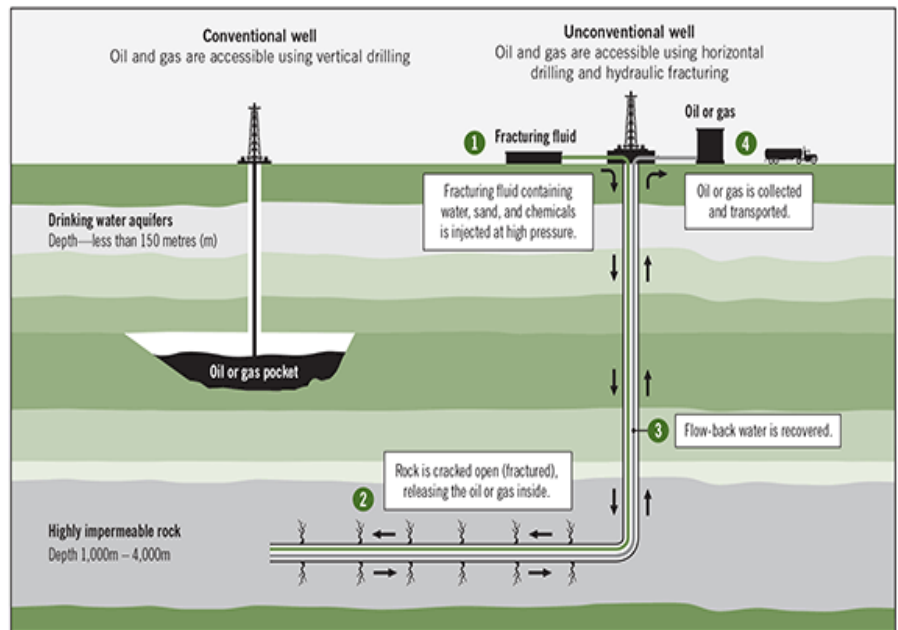
Completion ranges from two to three days for shallow gas or heavy oil in eastern Alberta, to more than eight months for complex formations in the Rocky Mountain foothills. The process typically includes:

1. Installation of the production casing: a steel pipe that runs the length of the well to ensure safe control of production and prevents water and rock from entering the well.
2. Installation of the production tube: tubing hangs from the wellhead and includes valves, chokes and pressure gauges to assist in regulating production.
3. Perforation of the well: entering the formation through the casing using an explosive device known as a perforating gun.
4. Stimulating the well: some wells contain enough pressure to push hydrocarbons to the surface, while others require stimulation. This is accomplished by injecting water, acids, or other chemicals to free the hydrocarbons. Hydraulic fracturing is a common.

Directional Drilling

There are several uses, including:

- Unable to obtain the surface rights immediately above the subsurface target;
- Surface complications that can make the establishment of the surface location above the target very costly; and
- To create relief wells and optimize production.



HOW IS UNCONVENTIONAL DRILLING DIFFERENT?

What is Unconventional Oil and Gas?

The Alberta Energy Regulator (AER) defines unconventional oil and natural gas as:

- Tight oil: oil found in low-permeability rock, including sandstone, siltstone, and shale.
- Tight gas: natural gas found in low-permeability rock, including sandstone, siltstones, and carbonates; and coalbed methane.

For more information on petroleum and natural gas production in Alberta, visit:

www.aer.ca

www.psc.ca/business/industry-overview/#wells-drilled