

TIGHT OIL



What is Tight Oil?

Tight oil refers to **crude oil** trapped within low **permeability** reservoirs deep below the earth's surface. **Reservoirs** with low permeability contain fluids which, typically, will not flow to a wellbore at economic rates without assistance from technologically advanced stimulation treatments or recovery processes.

How is Oil Stored in the Rock?

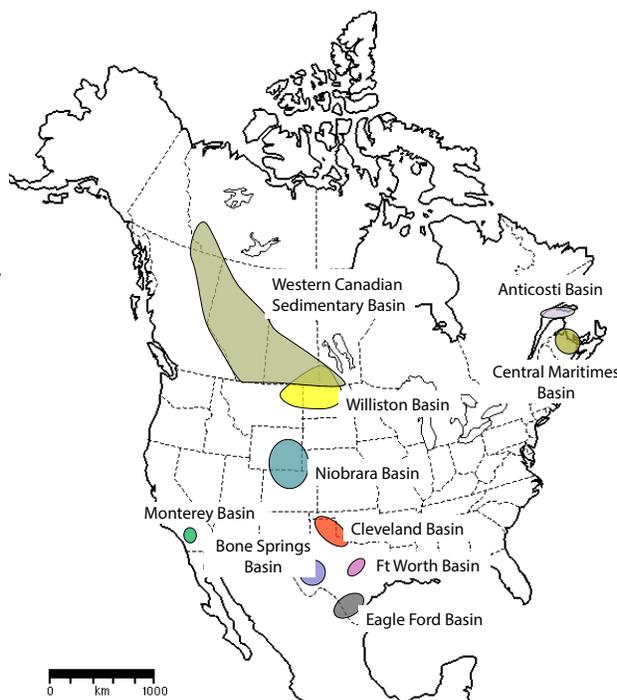
Oil is stored in the open spaces within the rock (the rock's **porosity**). The ability for the reservoir to release the oil or flow it to a wellbore is measured by the permeability of the reservoir. Reservoir rocks are like sponges in that they hold liquids (like oil) in small cavities (pores) found naturally in the rock. The percentage of pore volume (void space) within the rock that can contain fluids is called the reservoir's porosity.

Where is Tight Oil found?

Tight Oil is found throughout Canada's known oil-producing regions as well as various basins in the United States.

Tight Oil can also be classified into different categories based on geological characteristics. Industry refers to these categories as "plays".

(See sidebar on reverse for the different types of plays)



Major basins with potential for tight oil development are illustrated above.

TERMINOLOGY

Crude Oil: Mixture of naturally occurring hydrocarbons that is refined into diesel, gasoline, heating oil, jet fuel, kerosene, and literally thousands of other products called petrochemicals. Crude oils are named according to their contents and origins, and classified according to their per unit weight (specific gravity).

Reservoirs: The rock that contains potentially economic amounts of hydrocarbons.

Permeability: The ability of the rock to pass fluids or oil through it. The higher the permeability number, the greater the amount of fluid or oil that can flow through the rock. Permeability is measured in a unit called Darcies. Conventional reservoirs may have permeabilities in the 10's to 100's of milliDarcies or occasionally Darcy range. Unconventional or tight reservoirs usually have permeabilities in the micro to nanoDarcy (one millionth of a milliDarcy) range.

Porosity: The free space within the fine grained rock that can store hydrocarbons.

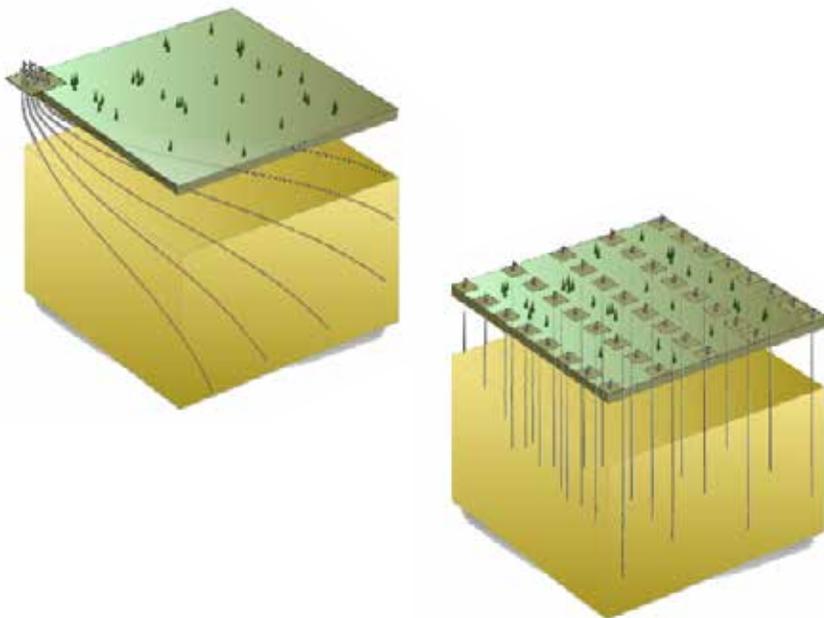
Technologies Used to Recover Tight Oil

The oil which is produced or extracted from tight reservoirs is similar to the oil which can be produced from conventional reservoirs; it is the application of advanced technologies which make these developments unconventional. Different technologies are used for different plays but the most common methods used today are horizontal drilling and multi-stage hydraulic fracturing. Once the oil has been unlocked from the tight reservoir and is able to flow to the wellbore, conventional technologies are used to produce the well. These can include pump jacks to lift the oil to the surface, storage tank facilities or batteries and pipelines and trucks used for transport.

Minimizing Footprint

The cumulative surface footprint of today's horizontal well tight oil development is significantly smaller than an equivalent development using vertical wells, as multiple wells can be drilled from a single pad location. A single well now has the potential to access oil beneath the surface from as much as three kilometers.

While the size of a multi-well pad lease is slightly bigger than a regular oil and gas lease, the cumulative footprint for a tight oil field development is much smaller than it would be with conventional development using vertical wells. Fewer access roads are required and the concentration of facilities and pipelines within the pad footprint further minimizes surface disturbance.



Source: Encana Corp

For more information about multi-stage hydraulic fracturing, please visit www.csur.com

OTHER TERMS

Formation - Consists of a number of rock units that have a comparable lithology, facies or other similar properties. Formations are not defined on the thickness of the rock units they consist of and the thickness of different formations can therefore vary widely.

Basin - A low-lying area on the Earth's surface in which thick layers of sediment have accumulated. Sedimentary basins vary from bowl-shaped to elongated troughs.

Halo Play - the fringe regions, or halos, surrounding the areas of historical oil production that are known to contain unproduced oil.

Geo-stratigraphic Play - a geologic formation known to contain significant oil resources over a large geographic region.

Shale Oil Play - rock which is predominantly organic-rich shale which contains oil. The rock is not only the source of the oil but also the reservoir.