

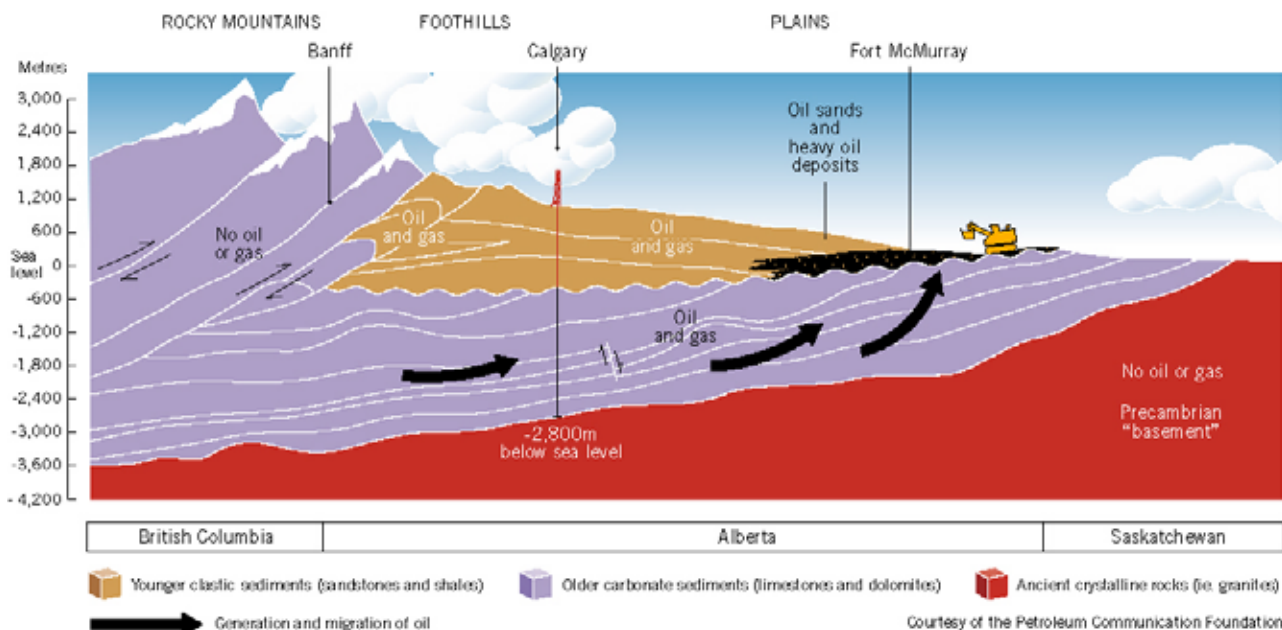
## GEOLOGY

### Why does Alberta have Oil Sands?

The formation of both conventional oil and the heavy oil of the oil sands required a certain set of conditions - the presence of organic material, bacteria, heat and pressure, a reservoir for the oil to accumulate and a lot of time (over 400 million years).

Like all crude oil, bitumen and heavy oil resources started out as living material. Oil is typically derived from marine (water based) plants and animals, mainly algae that have been gently cooked for at least one million years at a temperature between 50 and 150 degrees Celsius.

It is speculated that the naturally occurring oil sands evolved millions of years ago when an ancient ocean covered Alberta. The remains of tiny creatures called marine plankton that lived in the ocean formed organic material in the depressions in the sea bed. Bacteria removed most of the oxygen and nitrogen leaving primarily hydrogen and carbon molecules. Tremendous heat and pressure caused by layer upon layer of rock, silt and sand accumulated over time, which essentially pressure-cooked the organic material. The decomposition of the microscopic creatures led to a reorganization of their carbon and hydrogen bonds to form hydrocarbons or oil. This formation of oil is very similar to that of conventional oil deposits, except, the oil absorbed into the existing sand. Due to pressure from the formation of the Rocky Mountains, the oil was forced north into the existing sand deposits left behind by ancient river beds and formed the oil sands. Amongst the oil sands are fine particles of clay and other minerals such as various metals and sulphur.



#### Sources:

Albian Sands - AlbianAdvantage

The Science Behind the Oil Sands

Bott, Robert. *Our Petroleum Challenge, Sixth Edition- Exploring Canada's Oil and Gas Industry*. Petroleum Communication Foundation, 1999.

Petroleum Communication Foundation: [www.pcf.ab.ca](http://www.pcf.ab.ca)