



## Low-energy heavy oil production process

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### Summary

Horizontal Well Line Drive (HWLD) is a new innovative, economical and efficient process to produce heavy oil. Fluid is injected into a horizontal well high in the pay zone and a parallel horizontal producer is placed 50-100m offset at the base of the oil zone. When the oil rate has fallen to a low level, the producer is converted to an injector and a new offset producer is placed offset at the base. This process is continued as a horizontal well line-drive process. Compared with a staggered well configuration, only half the number of horizontal wells are needed and well drilling is much delayed. The injected fluid can be steam, polymer solution, CO<sub>2</sub>, hydrocarbon solvent, flue gas, water or air. In an in-situ combustion process, numerical simulation shows that with air injection, sweep efficiency was high and for an oil API of 10.5 and viscosity 50,000 cP, the oil rate averaged 52 m<sup>3</sup>/d (327 bpd) over 15 years, with an oil recovery factor over 80%. Compared with steam, in-situ combustion is 3-4 times more thermally efficient than steam, which means lower GHG emissions. Also there are no raw material costs. The addition of available CO<sub>2</sub> is beneficial to the process and the reservoir can serve for CO<sub>2</sub> storage. Ten (10) years of experience at the Petrobank Energy field pilots at Conklin (Bitumen) and Kerrobert (Heavy Oil) demonstrate that the produced oil will be upgraded by 3-Degrees API and that the produced gas will be viable for power generation. Pumps are not needed because liquids lift is accomplished by the produced gas. In the Conklin bitumen pilot (3-producers), the produced oil was easily upgraded further to pipeline specifications (350 cP, 22 °C) at moderate conditions with commercially available catalyst.

Another Process, Basement Flooding, eliminates well casing in the horizontal section.