The KREX Formation
Analysis, Characterization and Development

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Abstract

•This project aims at understanding and analyzing a new oil and gas development opportunity in the Rex formation.

•The project is a small scale greenfield to production exercise.

• Analysis and characterization of the reservoir showed a thin (3-5) sand formation, averaging 25% porosity and 10 - 60mD horizontal permeability.

•The pool at hand holds heavy oil (20 API). A section of the reservoir is simulated to test different development strategies including vertical, horizontal and multilateral wells.

Introduction

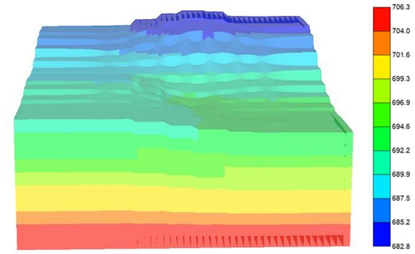
•Located in the Upper Mannville C pool, situated within the Viking Kinsella field in Township 48, Range 8W4 of eastern central Alberta, south of Wainwright Village.

•Discovered with well 1D0/02-18-048-08W4/00 in 1975 by Pacific Petroleums Ltd and currently managed by Cardinal Energy Ltd.

•Originating from the lower Cretaceous period. Distinguished by its sandstone reservoir, containing heavy oils.

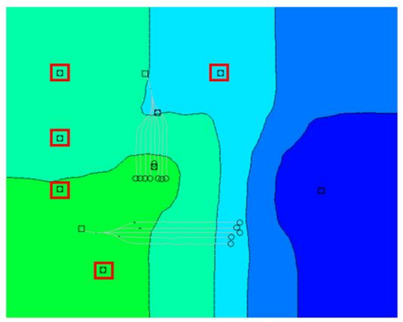
•The marine setting of the Rex pool features a deltaic environment.

Reservoir Depth Map (Metric)



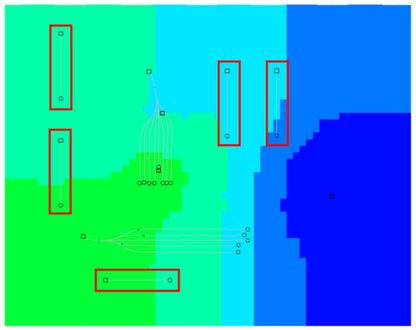
Development Strategy 1

- The first development strategy consists of drilling 5 vertical wells. This is the maximum number of wells that can be fitted through the simulated section while allowing for future infill drilling to improve the life of the field.
- Drilling vertical wells allows for lower Capex, and faster development.
- Each well is going to be 750m -TVD deep and perforated at the pay interval to allow for flow of oil given its heavy and high viscosity nature.
- The locations of the vertical wells were strategically chosen to ensure optimal distribution within the model. They were intentionally placed away from the gas cap region to prevent gas bypass and the use of elevated GOR levels. This arrangement also allows for the utilization of gas cap expansion as a driving mechanism.
- Drilling vertical wells allows for ease of transition into secondary drive mechanisms like waterflooding. However, it offers lower initial rates compared to horizontal and multilateral drilling.



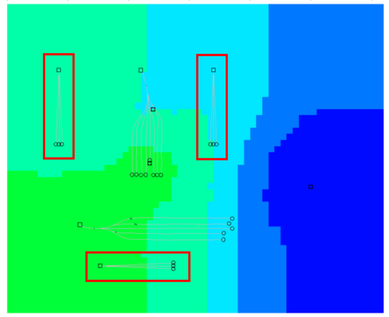
Development Strategy 2

- The second development strategy consists of drilling 5 horizontal wells.
- Drilling horizontal wells allows for larger reservoir contact which results in better production rates
- Each well is going to be 1694m of MD with 1000m long laterals. Wells will have an open-hole completion to facilitate flow to wellbore and due to the consolidated nature and the lack of need for sand control completion.
- The position of the horizontal wells were chosen to create space away from the gas cap. This was to avoid gas bypass, elevated GOR methods and utilize the Gas cap expansion as a drive mechanism.
- Drilling horizontal wells allows for better reservoir contact and are easy to convert to injectors for future pressure maintenance schemes.
- Drilling challenges arise due to the thin formation thickness, as some section may be outside of the pay zone due to drilling fluctuations.



Development Strategy 3

- The third development strategy consists of drilling three 3-legged multilateral wells, each spaced at 50m distance per interval.
- Like Development Strategy 2, this strategy will encompass the use and benefits of horizontal wells.
- Each well is going to be 1894m MD with a lateral length of 1200m and open-hole completion. The wells are positioned in a manner that reduces flow interference between multilaterals and reduces land footprint.
- Multilaterals allows for well pad drilling schemes which are beneficial in surface equipment management and facility planning.
- Multilaterals offer higher peak rates but are difficult to convert into injectors without running double tubing which is costly and difficult. They are generally more expensive to drill and slightly harder to manage.



References

1. Computer Modeling Group Ltd. (2022), CMG.

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