

# Clearwater Hydrodynamics and Reservoir Study

## Predicting Trends in Oil Productivity

### Introduction

The Clearwater has rapidly emerged as one of the top oil plays in the WCSB. The fairway spans 400 km of north-central Alberta, from Jarvie through Marten Hills to Golden. Clearwater operators have now drilled 1,300 laterals that are producing over 23,500 bopd. Shallow depths, high storage and low cost multi-lateral pad drilling provide top tier economics.

API gravity ranges from 10° API at Gift, to over 20° API at Marten Hills. Understanding the nature of the oil quality variations, as well as the interplay between oil quality and reservoir quality, is proving key to success within this play. Different sources and phases of oil migration, geothermal history and oil degradation all contribute to the variation in oil quality throughout the Clearwater play.

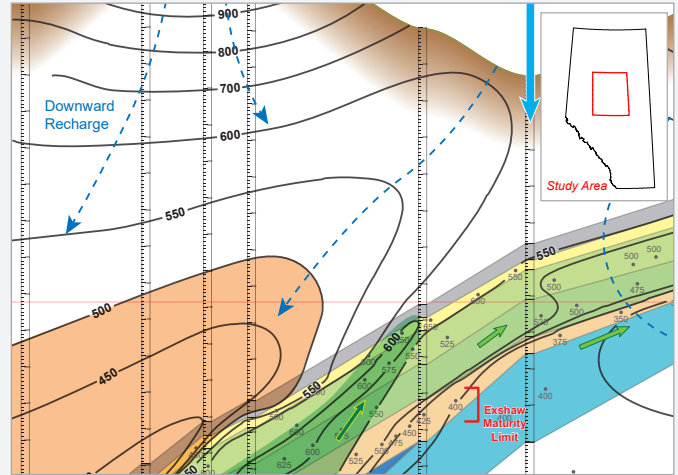
Early Clearwater players recognized a missed pay opportunity in the stacked delta front, shoreface and fluvial deposits. A sequence stratigraphic approach was utilized to subdivide the Clearwater. These correlations informed all aspects of this study. Core analyses, along with petrophysical analyses on select wells, were used to determine the petrophysical cutoff for net porous sand mapping. This regional mapping established the limits of current producing areas and provided insight into new play trends.

Clearwater pressure and fluid chemistry data were used to interpret the regional hydrodynamics and trapping configurations. The Clearwater and adjacent units are in hydraulic communication with a combination of downward and lateral flow. The Clearwater's dynamic hydraulic system, lower salinities and reservoir variability can result in susceptibility to oil biodegradation. Potential tilting of oil-water transition zones has been observed between the northwest, central and southeastern areas of Marten Hills.

### How Will This Study Help Me?

This study will enable existing operators, new entrants and investors to understand or predict the following:

- » Extent of the play fairways and remaining opportunities
- » Oil quality variations using CDL's proprietary geothermics data set
- » Oil migration pathways and areas of greater oil degradation vs preservation
- » Stratigraphic trapping configurations by integrating sequence stratigraphy and hydrodynamics
- » Drilling, production and economics analytics to provide best practices and economics within existing development areas and as analogues for evaluating new prospective trends



Hydrostratigraphic Cross-Section and Study Area: T59 to T92, R18W4 to R19W5

### Deliverables

#### Clearwater History and Economics

- » Drilling and Production Analysis
- » Probabilistic Type Curves
- » Drilling Economics
- » Recovery Factor Analysis

#### Stratigraphic Framework and Depositional Setting

- » Regional Stratigraphic and Pool Cross-Sections
- » Regional Structure and Third-Order Residual Structure Maps

#### Hydrodynamics

- » Pressure vs Elevation (PE) Graph
- » Hydraulic Head Maps
- » Water Salinity Maps
- » Hydraulic Cross-Section

#### Oil Quality, Degradation and Productivity

- » Oil Gravity (API) Map
- » Oil Viscosity Analysis
- » Oil Productivity Analysis

#### Petroleum Systems

- » Geothermal Gradient Map
- » Clearwater Isotherm Map
- » Oil Migration Map and Cross-Sections
- » Marten Hills Case Study

### Purchase Details

\$42,500 plus applicable taxes

Release date: April 2020

#### Contact Client Relations

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