

The Hydrocarbon Potential of the Birdbear Formation, South Eastern Saskatchewan – Preliminary Results*

Kathryn M. Fiess¹

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¹Saskatchewan Ministry of Energy and Resources, Regina, Saskatchewan (kathryn.fiess@gov.sk.ca)

Abstract

The Upper Devonian Birdbear Formation of south eastern Saskatchewan is composed of porous and permeable dolostone, dolomitic limestone and anhydrite and is the stratigraphic equivalent to the Nisku Formation of Alberta ([Figure 1](#)). Light oil with gravities that range from 34 to 39 degrees API has been found structurally trapped in dolostone reservoirs at Hummingbird, Kisbey, Ceylon, Flat Lake, and Tatagwa pools ([Figure 2](#)). No stratigraphic traps have been identified for this formation in Saskatchewan to date, although it is likely that such traps do exist.

The frequent inability to identify the presence of hydrocarbons from the analysis of geophysical well logs and the nebulous nature of DST results of the Birdbear carbonate, coupled with the small recoverable reserves estimates and high initial percentage water cuts for existing pools, have rendered the Birdbear a less than glamorous exploration target. The geophysical well log characteristics of wells currently producing oil from Birdbear carbonates are anomalous. Oil is being produced from intervals that appear “wet” on resistivity logs ([Figure 3](#)). Furthermore, wells that recovered salt water and oil-cut mud from drillstem tests are capable of significant oil production ([Figure 3](#)). The purpose of Saskatchewan Energy and Resources Birdbear Formation study of south eastern Saskatchewan is to evaluate the undeveloped hydrocarbon potential for this interval in the area defined by TWP 001 to 22 RNG 30W1M to RNG 1W3M ([Figure 2](#)). A significant aspect of the study will be to develop an understanding of the cause(s) of the low-resistivity log response in the oil-bearing carbonate and the possible cause(s) for salt water recoveries from drillstem tests of intervals that are later perforated and capable of oil production. These data will then be assessed to determine if areas of bypassed pay potential can be identified and mapped for the Birdbear within the study area. A secondary objective is to identify area(s) where stratigraphic traps are most likely to occur.

Analytical methods to be employed in this study include log evaluations of the Birdbear Formation, water saturation calculations, analysis of production characteristics of Birdbear oil pools, core and thin-section evaluation of perforated intervals with Birdbear hydrocarbon production, SEM studies, and regional geological mapping. Work was initially commenced on this project in November, 2011, and the project estimated completion date is approximately November, 2012. The purpose of this paper is to present a snap shot of the results to date. Thus far, the data supports the hypothesis that the Birdbear carbonate of south eastern Saskatchewan predominantly produces oil from oil-water transition zones located on structurally closed highs. The results of preliminary thin-section evaluations also support the interpretation that most of the oil- and

water-producing Birdbear carbonate is characterized by a significant volume of microporosity. The presence of microporosity in the reservoir could substantially reduce deep-resistivity well-log readings and cause anomalously high water saturation calculations for hydrocarbon-bearing intervals.

Acknowledgments

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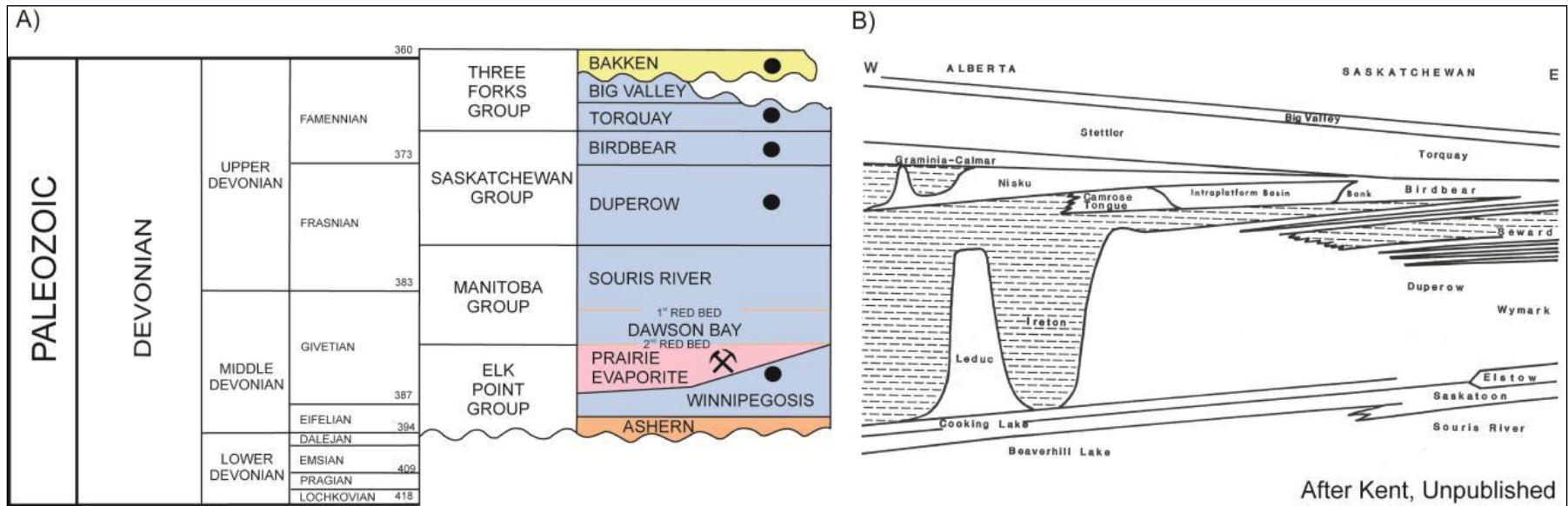


Figure 1: Devonian Stratigraphy. A) Stratigraphic chart south eastern Saskatchewan. B) E to W stratigraphic section of the Saskatchewan Group - Saskatchewan to Alberta.

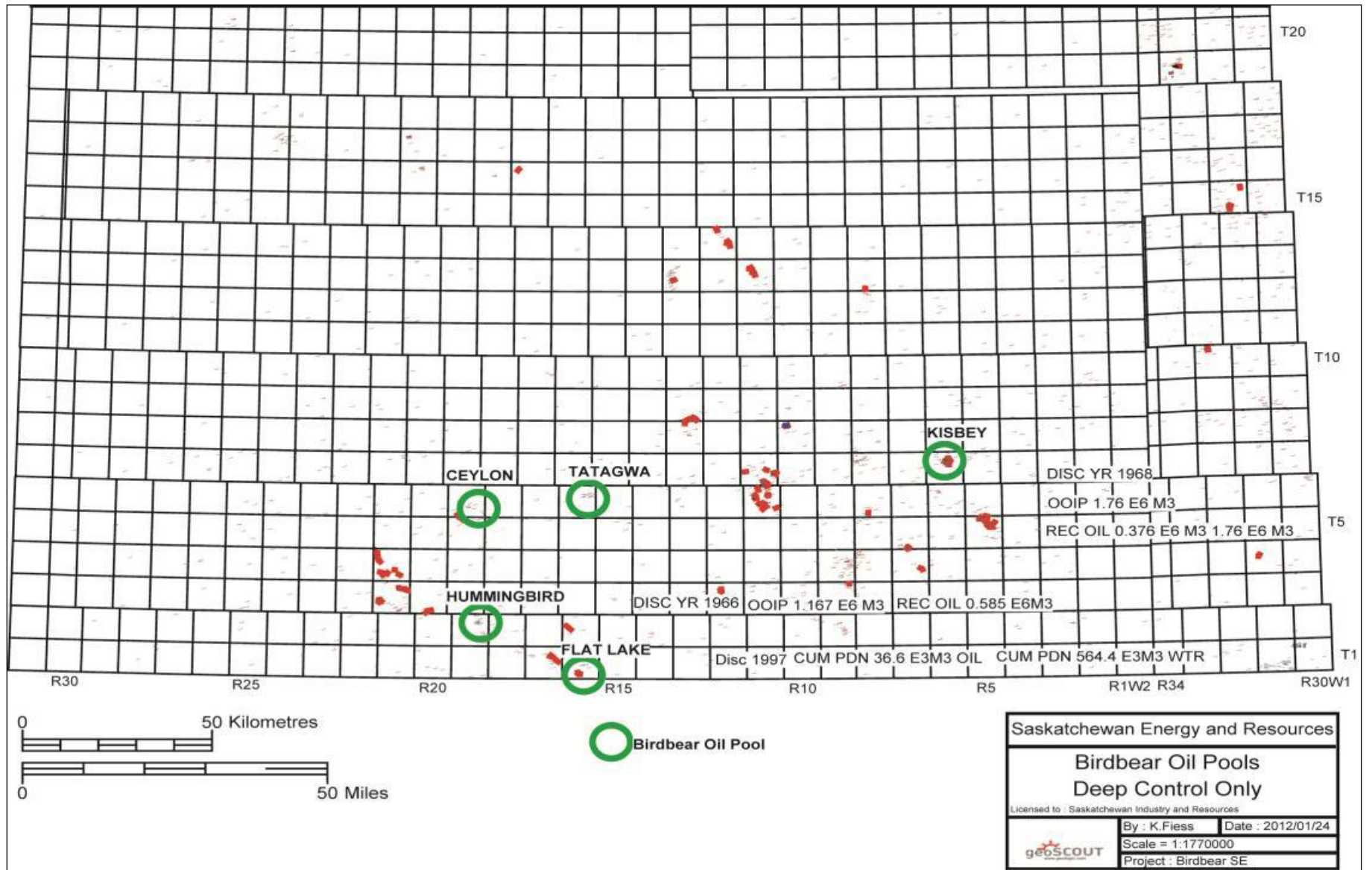


Figure 2. Distribution of Birdbear oil pools in south eastern Saskatchewan.

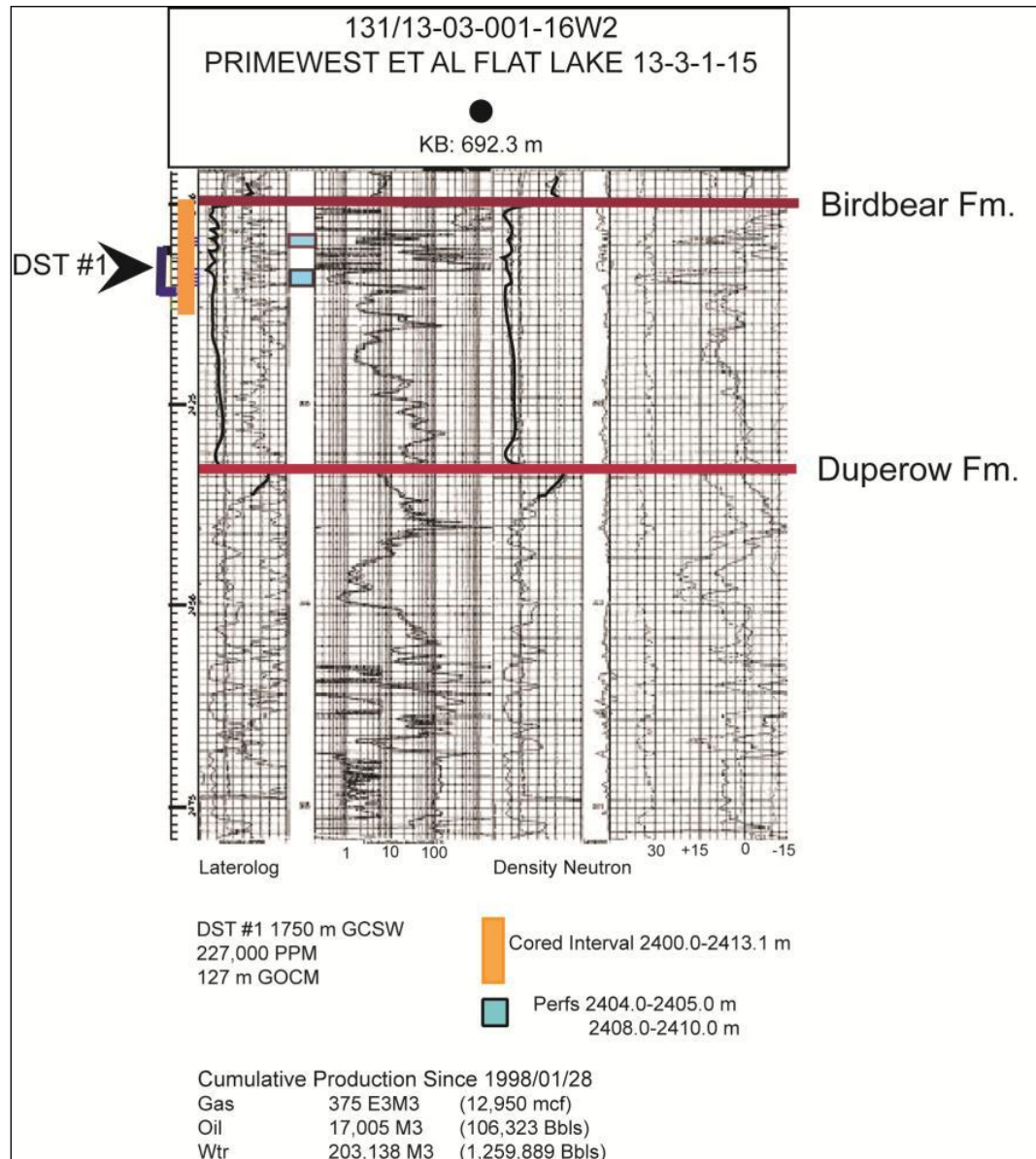


Figure 3. Resistivity (laterolog) and porosity (CNLDT) logs for Flat Lk. 13-03-001-16W2 well, with low-resistivity oil production. No free oil was recovered from the drillstem test.