

The Ratner Laminite: A New Potential Devonian Play as Outlined in Prospect Saskatchewan

Erik Nickel¹ and Andrew Nimegeers²

The Ratner Laminite in southeastern Saskatchewan is a prospective, yet under-explored, unit in the Devonian section.

The Middle Devonian Winnipegosis Formation in southeastern Saskatchewan is subdivided into Lower and Upper members. The Lower Winnipegosis is mainly a non-porous, often organic-rich, lime mudstone and dolomudstone deposited in an open-marine platform setting. The Upper Winnipegosis is comprised of carbonate build-ups (reefs), and inter-reef deposits of the Ratner and Brightholme subunits. Capping the entire Upper Winnipegosis and Ratner is an anhydrite/halite unit of variable thickness called the Whitkow Member of the Prairie Evaporite.

The Ratner porous zone has been dolomitized to a granular/sucrosic texture with intercrystalline porosity. In Bryant 111/7-4-5-7W2, core analyses and geophysical well logs indicate 13 to 19% porosity with permeability up to 26 mD. A uniform light- to medium-brown oil stain is present over the entire 3 m thick porous zone. In 2001, a test of the Ratner porous zone in this well produced highly pressurized gas-cut oil to surface. Later, a horizontal well (191/07-04-005-07W2) drilled in the Ratner porous zone on the same section had an initial production of 89 m³/day and subsequently attained a cumulative production of over 14,000 m³ before it was shut in four years later in July, 2006.

Porosity development within the Ratner Member is related to the degree of dolomitization. A sucrosic dolostone reservoir facies is identified within the Ratner near the flanks of the Winnipegosis mounds, and proximal to thick anhydrite deposits of the Whitkow Evaporite. Where developed, the Whitkow Evaporite and interbedded to interlaminated sequence of carbonate and anhydrite near the top of the Ratner provide a competent caprock to the porous facies.

Understanding the mechanisms involved in the dolomitization of the Ratner Laminite is important for developing an effective predictive model for exploration programs within the Ratner. Porous Winnipegosis reefs may have acted as conduits for Mg-rich fluids associated with the Whitkow Evaporite, allowing the dolomitizing fluids to migrate downward and laterally along bedding planes in the Ratner Laminite. Farther away from the reefs and the thicker Whitkow Evaporite section, the Ratner appears to be less dolomitized and the organic-rich Brightholme limestone, a potential oil source rock, may be present.

By applying this dolomitization model to the associated stratigraphy, inferences about the location of Ratner Porosity development can be made. Further work to identify the presence of porous Ratner dolostone in conjunction with structurally 'high' regions would be beneficial.

This hydrocarbon "play", along with several others, can be found summarized in "Prospect Saskatchewan", a periodical SIR publication that highlights various potential prospects with the goal of spurring exploration activity in the province. Prospect Saskatchewan issues can be obtained at the SIR booth or by signing up for an online subscription.

¹Saskatchewan Industry and Resources, Regina, SK

²Caprice Resources Ltd., Weyburn, SK

Erik Nickel is a geologist with the Petroleum Geology Branch of Saskatchewan Industry and Resources. Erik has worked for SIR for 8 years following a 5-year period as a well site geological consultant working primarily in southeast Saskatchewan. Erik has a Bachelor's degree in geology from the University of Saskatchewan, and is nearing completion of his Master's degree from the University of Regina. Email: enickel@ir.gov.sk.ca