

Facies and reservoir-enhancing dolomitization surrounding monadnocks in the Slave Point Formation in the Dawson Field, Alberta

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ABSTRACT

The Dawson Field is located on the southwestern flank of the Peace River Arch. Most pools produce medium gravity (~35 API degrees) oil, some natural gas, from the Middle Devonian Slave Point Formation, which is extensively dolomitized in this area. The Dawson Field has been producing since 1983, yet little is known about the controls on porosity and permeability evolution through time, and their relationship to facies and reservoir-enhancing dolomitization. The major objectives of this study are to characterize (1) depositional facies; (2) types of dolomite; (3) types and distribution of porosity; (4) fluid chemistry and evolution which controlled diagenesis.

The geometry of the field is delineated by digital seismic. Exploration concentrates on “reefs” that appear to have grown along the steep-dipping flanks of the Precambrian basement on highs that appear to be erosional remnants (monadnocks), a rather unusual trap type. However, these “reefs” are not reefs in the conventional sense, as they do not consist of biohermal structures; at best, they are small, muddy patch reefs, ranging in thickness from 1 – 3 m, with associated lagoonal and foreslope facies. The reservoir is mostly porous lagoonal facies ranging in the thickness from ~0.5 – 2.5 m with about a 500 m aerial extent. These facies appear to have had the highest primary porosity that was enhanced by replacive dolomitization. Of 26 wells cored from the Slave Point at Dawson, 23 contain either matrix and/or saddle dolomite. Geochemical investigations are underway to characterize the process of dolomitization and related porosity enhancement.