Anhydrite Cementing within the Artex Member: A Porosity and Permeability Model

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Abstract

The Charlie Lake Formation deposited during the Middle – Upper Triassic is poorly understood due to limited research and, until recently, economic interest. Primary research, such as Fefchak's (2011) thesis on the sedimentology concentrating on the description of the unfossiliferous mixed siliciclastic, carbonaceous, and evaporitic rocks, has provided new opportunities to interpret the complex system and aid in potential production. Renewed economic interest began in 1987 by Canadian Hunter Exploration, focusing on the Artex Member of the formation. This reservoir produced a light crude (57˚ API), produced from a very fine- to medium-grained aeolian sandstone found at Brassey Oil Field.

Anhydrite and/or calcite cement are important diagnostic properties for reservoir quality within the Artex Member of the Charlie Lake Formation. Analysis of petrophysical well logs, core, thin sections, and porosity and permeability data obtained from core analysis help to understand the diagenetic process that took place within this member. This research focuses on the type and pervasiveness of cementing and provides a petrophysical model of porosity and permeability to determine the extent of the potential reservoir.

Two types of cementing, nodular and patchy, are observable and each have varying properties that affect porosity and permeability. Nodular cement is characterized by one or more crystals in an available pore space that forms a tight grouping, whereas patchy cement is characterized as a cement filling in all available pore throats and pore spaces. These cements primarily form at the top and bottom of the sand body, however; cementing does vary throughout the deposit.

A higher average of porosity and permeability implies that cementing does not cause any adverse effects on the potential production value within this zone. Porosity and permeability models illustrate these ideal results and describe the location of the cement within the Artex Member across the study area of Brassey Oil Field.

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