

Subsurface Stratigraphic Mapping of the Middle Devonian Carbonates: Beaver River Gas Field, Liard Basin, Northeastern British Columbia

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Abstract

The Middle Devonian strata of the Beaver River Gas Field (BRGF) include the Elk Point Group of the Western Canada Sedimentary Basin and consist of an extensively dolomitized succession equivalent to the diagenetic facies of the Manetoe Dolomite of the Kotaneelee (Yukon) and Pointed Mountain (NWT) gas fields. The dolomitization processes significantly affect the primary sedimentary structures and textures of the original carbonates. The pervasive dolomitization has also obliterated most of the initial microfacies attributes, creating difficulties in subsurface lithostratigraphic mapping and impediment to the interpretation of the depositional setting of the succession and its correlation with strata in the adjacent regions of Northeast Alberta, southeast Yukon and southwest NWT.

Detailed mapping of core intervals, microfacies analysis and subsurface well-log examination from several wells of the BRGF show a vertical transition from lagoonal to intertidal-flat mudstones and bioclastic wackestones (Stone/Lower Chinchaga-equivalent) through low to moderate energy subtidal bioclastic mudstones-packstones to stromatoporoid floatstones (Upper Chinchaga/Lower Keg River-equivalent) to moderate to high energy coral-stromatoporoid floatstones/rudstones to boundstones of a reefal setting (Upper Keg River/Nahanni-equivalent). The upper part of the Stone/Lower Chinchaga-equivalent strata is characterized by mudrocks that fill dissolution vugs or are represented as scattered angular extraclasts. These mudrocks may be related to the mid-Chinchaga detrital break (or Stone-Duniden unconformity) recognized elsewhere in the basin. Thick shales of the Besa River Formation shut down the Middle Devonian carbonate factory and mantle the upper reefal facies in the study area. Porosity is exclusively secondary and increases upsection, with promising reservoirs occurring in the upper bioclastic-rich facies of the succession.