

Anatomy Of A Jean Marie Shoal, July Lake Area, Northeastern British Columbia

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Abstract

The Jean Marie Member of the Redknife Formation is a gas saturated limestone that extends throughout a wide area of northeastern British Columbia and northwestern Alberta. Extensive drilling in the last 5 years suggests producible reserves of gas from 5 to 10 TCF, as well as some liquid condensate production. A major question in exploiting this unit is whether to treat it as a relatively uniform gas resource play or as a limestone where the development of certain facies and/or diagenetic overprints can result in higher reserves and better flow rates. Another question to be addressed is the difference in flow rates between vertical and horizontal wells.

The detailed description of 18 cores from vertical wells drilled in the early 1990's in the July Lake area of northeastern British Columbia provides a basis for evaluating these questions. The Jean Marie in these wells varies from approximately 12 to 21 m thick and consists of coalescing patch reef facies that are interpreted to make up a shoal that extends for a distance of at least 30 km in a SSW to NNE direction. The Jean Marie in the July Lake shoal is made up of 2 complete TR cycles and a part of a third. The basal approximate 3 m of the Jean Marie consists of brachiopod-bearing lime wackestones that were deposited on an areally extensive carbonate ramp. This deposit represents progradation of shallower-water limestones out over deeper-water shales of the underlying Fort Simpson Formation. The second TR cycle attains a maximum cumulative thickness of about 16 m and consists of coalescing patch reef facies where the reefs are interpreted to be only 50-100 m across. The uppermost TR cycle consists of either a continuation of these patch reef facies or intervening, deeper-water ramp deposits that consist of *Amphipora* or branching rugose or tabulate corals. In the July Lake shoal, these reefs attain a maximum cumulative thickness of approximately 21 m, but further south (well d-A69-D/94-P-8) are known to grow to an accumulative thickness of 25 m.

Reservoir facies in the Jean Marie in the July Lake shoal are of 3 main types: (1) Fractured patch reef facies consisting of platy stromatoporoids and pendant *Renalcis* that grew downward into shelter cavities beneath the platy stromatoporoids. Porosity occurs in mainly molds of *Renalcis*

that are connected by gash-like fractures. (2) Fractured detrital stromatoporoid-coral foreslope facies with well-developed micro-porosity of leached origin. (3) Fractured detrital foreslope facies with enhanced reservoir quality related to extensive micro-dissolution in limestones adjacent to thin dolostones, as well as macro-dissolution voids in the dolostones. The scattered occurrence of these dolostones suggest dolomitization along fault zones.