

Stratigraphy and Sedimentology of the Upper Montney Shale Gas Reservoir North East British Columbia, Canada

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In North Eastern British Columbia (NEBC) the Triassic Montney Formation has been recognized as a world class shale gas reservoir, providing the hydrocarbon source, reservoir and trap. This presentation forms part of an ongoing study to define and describe the constituent lithofacies and associated depositional features that make up this reservoir. It is part of a much larger project to improve the understanding of the reservoir properties to establish best practices for Montney shale gas development.

The Montney was deposited in the Peace River Embayment (PRE) a broad fault controlled re-entrant that developed in the late Devonian through to the Mississippian and persisted as a broad downwarp through the Triassic. An island arc is believed exist to the west which places the PRE in a back-arc tectonic setting. The Montney forms a siliciclastic dominated wedge unconformably overlying the Permian Belloy Formation and unconformably overlain by (from west to east) the Doig, Halfway, Charlie Lake, Nordegg, Fernie and Gething formations. It is dominated by clastic sedimentation, although it has a significant carbonate component with evidence for shoreline/deltaic sedimentation to the east and dysaerobic to euxinic shelf/basin environment in the west.

The Montney can be subdivided into Upper, Middle and Lower units which generally correspond to basin geo-parameters (tectonics and configuration). Further sub-division is generally done on the basis of regional resistivity markers. The Upper Montney is the primary reservoir in the study area and therefore is the focus of this study.

The Upper Montney is comprised of a cyclical pattern of sedimentation. Each major cycle (4th order sequence?) follows a general muddy to sandy upward trend over 10's of meters that stack defining an overall progradational package. Each of these cycles is comprised of sub-cycles of thinner, coarsening upward storm cycles. Three component lithofacies associations have been identified and described: Proximal Shelf, Middle Shelf and Distal Shelf/Abyssal.

Prior to 2008 most of the horizontal development in NEBC targeted the sandier proximal sections within these cycles. More recently companies including Talisman have been targeting areas where the more distal lithofacies are more dominant and the reservoir has greater thickness and storage capacity.