

Gas Shale Potential of Organic Rich Strata in the Western Canadian Sedimentary Basin

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Volumetrically important organic rich mudrocks occur throughout much of the Phanerozoic succession in the Western Canadian Sedimentary Basin. These strata are similar to economically important gas producing shales in the United States yet have received little study or exploration.

To date we have investigated the gas storage capacity (sorption capacity) of the most important organic rich mudrocks including the Exshaw, Bakken, Nordegg, Second White Specks, Belle Fourche, Fish Scales, Duvernay, and Shaftesbury. High-pressure sorption analyses coupled with organic geochemistry, petrology, and inorganic geochemistry show that for all strata there is a positive correlation between sorption capacity and abundance of organic matter and kerogen type. All strata vary geographically in organic matter abundance, kerogen type, and maturity hence gas shale potential. For example at low reservoir pressure of 5 Mpa, the sorption capacity of low maturity (420°C T_{max}) Belle Fourche shale with 1.44% total organic carbon is 0.3 cc/g whereas at the same maturity an Exshaw shale with 11.8% TOC has a sorption capacity of 1.37 cc/g. At high levels of maturity but the same organic matter content the sorption capacity and hence gas reservoir capacity of the shales is higher. For example mature Nordegg shale with 22.5% TOC has a sorption capacity of over 2 cc/g. Such sorption capacities are comparable to important gas producing shales in the United States such as the Antrim and Barnett shales.