

Identifying and Interpreting Basin-Centered Gas Accumulations in Western Canada

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ABSTRACT

Basin centered-gas accumulations (BCGAs) are present in Devonian to Tertiary aged sediments in Western Canada. First documented in the late 1970s in the area known as the "Deep Basin", these systems have been identified in a near continuous band from Southern Alberta to Northeast British Columbia.

Examples from the Milk River, Edmonton Group, Peace River Group, Spirit River Group and the Jean Marie illustrate the numerous logistical and conceptual hurdles that need to be overcome for us to properly characterize Basin Centered Gas Systems.

Very low-pressure drill stem tests may not be included in digital pressure databases. When low-pressure measurements are available the investigator often culls them out of the study. Regional hydrogeological investigations may fail to recognize continuous gas accumulations because production data is not incorporated. Most of the Western Canadian BCGAs are under pressured and pore volume expansion is often invoked as a mechanism to generate under pressure. The use of conventional hydrogeological mapping tools leads us to the incorrect interpretation of fluid flow directions. Gas migration in BCGAs will be completely independent of hydrogeological boundary conditions.

It is important to approximate the water/gas contact before trying to interpret fluid flow directions. Up dip gas migration is often inhibited by the presence of water-filled pores and water migration by gas filled pores due to simple relative permeability effects. The head contours on conventional potentiometric maps are perpendicular to the water-gas contact in a BCGA. This is because the contact represents a no-flow boundary to water.

BCGAs in Western Canada exhibit a diversity of gas sources, formation ages, permeabilities and lithologies. Features common to all of these systems are the presence of a regionally extensive continuous gas phase, sub hydrostatic formation pressures, formation outcrop and a gas pressure gradient decreasing towards outcrop.