

## **Regional Underpressure And Gas-Saturation In The Upper Cretaceous And Tertiary Of Central Alberta**

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### **ABSTRACT**

The Upper Cretaceous and Tertiary sandstones of Central Alberta (Paskapoo, Scollard, Edmonton, Horseshoe Canyon and Bearpaw) form a major shallow, low-pressure gas resource. The source of this gas is likely from associated coal seams. These zones were initially bypassed due to formation damage and low gas prices.

A normal water gradient is up to 350% overbalanced in some of these formations. A detailed examination of over 800 pressure tests confirmed that the Scollard member and Edmonton Group are pervasively gas-saturated. Formation pressures decrease with proximity to formation outcrop along the Red Deer River. Conventional hydraulic head calculations using these data result in an east-west hydraulic gradient.

The extreme underpressures in these zones have been attributed to pore volume expansion associated with erosional unloading. This paper proposes an alternate hypothesis. Gas pressure gradients show a predominantly west to east gradient. The lowest measured formation pressures (<200 kPa) were usually found within 20 km of the formation outcrop. It appears that the bulk of the gas is migrating up dip in response to the regional gas pressure gradient. Post-Tertiary methane desorption from associated coals and vertical migration of gas from underlying units are minor components of the regional gas migration system. Lateral migration of gas towards outcrop along the Red Deer River Valley is proposed as a mechanism to create underpressures in the Upper Cretaceous and Tertiary sandstones in Central Alberta.