

# **Stress Analysis - Central Alberta: The Hunt for Permeability**

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## **Introduction**

Unconventional gas trapped in microdarcy sands, organic rich shales and coalbeds represents a potential resource well in excess of all the Western Canada Sedimentary Basin's (WCSB) conventional gas. Exploration for this resource is best described as a hunt for permeability, where economic exploitation relies heavily on the design and execution of well completion and stimulation. So how does one improve the chances of finding permeability, and develop more successful frac designs?

## **Background**

The relationship between stress, diagenesis and permeability was discussed by Brighenti (1989) and Gretener (1996). Petrophysical service companies have long understood the effect that stress has on permeability, in fine grained rocks, and routinely correct surface derived air permeability to permeability under the effective stress conditions of the reservoir. Bustin (1997) discussed the strong control that stress has on the permeability of coals.

Our premise for conducting this investigation is that:

- a) areas of lowest minimum principal horizontal stress are less likely to suffer diagenesis and more likely to maintain open fractures, and
- b) areas of highest differential stress are most likely to have induced fracture development.

The correlations developed between current day stress, areas of pervasive gas saturation, tectonics and associated post-Laramide erosion provide unique tools for highgrading areas for unconventional gas exploitation.

## References

- Brightenti, G., 1989. "Effect of Confining Pressure on Gas Permeability of Tight Sandstones," In: "Rock at Great Depth." V. Maury and D. Fourmaintraux (eds.). Balkema, Rotterdam, pp. 187-194.
- Bustin, R.M., 1997. "Importance of Fabric and Composition on the Stress Sensitivity of Permeability in Some Coals, North Sydney Basin, Australia - Relevance to Coalbed Methane Exploration." AAPG Bulletin, vol. 81, no. 11, pp. 1894-1908.
- Gretener, P.E., 1996. "Geomechanics for Geologists and Geophysicists." Lecture notes, p. 555.