

# Exploration Strategies for Shallow Gas Systems on the Margins of Rocky Mountain Basins

George W. Shurr\*

GeoShurr Resources, LLC, Rt 1, Box 91A, Ellsworth, MN, 56129, USA  
geoshurr@prairie.lakes.com

## ABSTRACT

Accumulations of shallow natural gas located on the margins of Rocky Mountain Basins fall into three distinctive systems: migrated thermogenic, early generation biogenic, and late generation biogenic. Each separate system has a unique exploration strategy.

Shallow thermogenic gas has migrated from a "kitchen" in the basin center, is generally found in conventional reservoir rocks, and is trapped in sealed buoyancy traps. Traditional strategies borrowed from oil exploration are commonly employed. Migrated biogenic gas can also be found by using these strategies. Foreland structures in Wyoming provide examples of migrated shallow gas production.

Early generation biogenic gas is formed by methanogenesis during or shortly after deposition of interbedded source and reservoir rocks. In situ gas is dispersed through unconventional reservoirs that blanket large basin margin areas. The Southeast Alberta Gas Field is a classic example. Strategies employed in deep, basin center gas exploration are also useful in exploration for shallow, in situ gas. For example, localized sweet spots can be identified by mapping regional lineament blocks that influenced deposition, erosion, diagenesis, and deformation of host rocks.

Late generation biogenic gas is generated in the relatively recent geologic past, long after deposition of the host rocks. Exploration strategies for in situ late generation gas in unconventional reservoirs are similar to those used for early generation gas. However, shallow ground water movement along a basin margin is an additional important consideration, because late generation biogenic gas is often found in aquifers. Coalbed methane production on the northeastern margin of the Powder River Basin is an important recent example.