# Integrated Fracture Characterization for a Foothill Tight Gas Reservoir

Jiajie (Jeff) Chen*
Marathon Oil Company, Houston, Texas, United States
jchen@marathonoil.com

Mark Petersen
Marathon Oil Company, Houston, Texas, United States

Pauline Chung
Burlington Resources, Calgary, Alberta, Canada

and

William Jamison,
Upper Crust Inc., Calgary, Alberta, Canada

**Abstract**

How do we get new petroleum from old basins?

To objectively characterize tight gas reservoirs and formulate the most feasible field development plan, detailed fracture analysis should be performed in conjunction with integrated reservoir modeling, deposition and deformation evaluation, as well as petrographic, cementation and structural diagenesis analyses.

The study area we use to illustrate this concept is located in the eastern margin of the Rocky Mountain Foothills belt in southwestern Alberta, Canada, with complex thrust faults and imbricate folds. The field and its nearby plays possess significant reserve potential. However, without profound analysis from field to microscopic scales, the resource potential and associated risks in economic development can not be fully understood.

A comprehensive approach was applied to characterize this tight gas field. The workflow involves a number of steps, including full field static reservoir modeling to assess the total resource potential, depositional environment analysis to understand the influence of original sediment inputs, deformation evaluation to reveal the types, pattern and openness of various fracture sets, and fracture diagenesis analysis on a microscopic scale to understand the cementation history and degradation of the fracture systems. Our results led to an estimate of the total resource potential. We concluded that with unfavorable accumulation of volcanic arenite, the matrix of the reservoir rock has been extremely tight at its very beginning, and the shear fractures in this lithology are not expected to carry flow, nor respond well to hydraulic fracture simulation. A strategy of producing at low raties under a long-term development plan can thus be recommended.