

Fracture Analysis in the Tight Gas Cretaceous Mesaverde Group, Uinta Basin, UtaG

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The Mesaverde Group in the Uinta Basin in northeastern Utah contains substantial remaining reserves and several trillion cubic ft of undiscovered resources (USGS, 2003). Economic production requires the presence and adequate connectivity of the natural fracture system in order to provide sufficient drainage and permeability for wells. We acquired fracture data through scanline sampling in the Mesaverde at four outcrop locations throughout the Uinta Basin in different lithofacies and structural positions. The surveys were designed to assess the dependence of major fracture-set orientation and intensity on both the lithofacies type and structural evolution. In addition to field work, fractures within the Mesaverde are being examined in a 6-m section of slabbed core at the Utah Core Research Center. The purpose of the fracture analysis throughout the basin is to ultimately develop a subsurface 3D fracture model of the Mesaverde Group in the Uinta Basin. These subsurface fracture models will be used in conjunction with numerical hydrofracturing simulators to develop a better understanding of the interaction of hydraulic fracture design and the natural-fracture network which will result in more efficient production and minimized costs.

Three locations within 55 km are examined on the southern, gently dipping limb along the northern edge of the basin. These locations include Asphalt Ridge, Snake John Reef, and a location near Rangely, Colorado. A more southerly location was also examined within San Arroyo Canyon. Preliminary fracture analysis reveals that all locations have a predominant northwest trending ($\sim 322^\circ - 343^\circ$) fracture set. A northeasterly trending fracture set was also identified at Asphalt Ridge ($\sim 034^\circ$), San Arroyo Canyon ($\sim 037^\circ$) and Rangely ($\sim 058^\circ$). A pervasive north – south-trending fracture set ($\sim 358^\circ$) is identified at Asphalt Ridge that cuts through the other fracture sets. Fractures in the different formations that comprise the Mesaverde Group were examined at the various locations. At Asphalt Ridge, Snake John Reef, and Rangely, the fractures within the Sego Sandstone and the Castlegate Formation were sampled. At San Arroyo Canyon, fracture sampling was taken in the Farrer and Tuscher Formations. Calcite- and quartz-mineralization have been identified within some of the fractures, however, perceptible mineralization within most fractures is rare. Results are presented from a preliminary 3D Discrete Fracture Network model based on the outcrop and core data.