

Well Core Description and Natural Fractures of the Sego and Castlegate Sandstones of the Cretaceous Mesaverde Group, Greater Natural Buttes Field, Uinta Basin, Utah

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A detailed description of over 200 ft (61 m) of slabbed core from the Sego and Castlegate Sandstones (Upper Cretaceous Mesaverde Group) was conducted to identify and characterize depositional environments and natural fractures in Greater Natural Buttes field (GNB), Uinta Basin, Utah. GNB field lies in an area of gentle northwest dip on the southern flank of the basin. The field produces natural gas primarily from the Mesaverde Group and the Tertiary Wasatch Formation. GNB has produced over 1.8 TCF of gas from about 3750 wells.

Most of the gas production is from highly compartmentalized, lenticular channel sandstones in the upper portion of the Mesaverde Group. The Sego and Castlegate Sandstones in the lower portion of the Mesaverde typically have higher water saturation and are not typically productive, but have depositional and fracture characteristics similar to productive sandstones. Production in these tight-gas-sandstone reservoirs is achieved through massive hydraulic fracture treatments, so understanding the natural fracture systems and reservoir heterogeneity created by various depositional environments can aid in hydraulic fracturing optimization and lead to better drilling and completion strategies.

The Sego and Castlegate core was recovered from the NBU no. 253 well (section 10, T. 9 S., R. 21 E.). The well was initially completed in the Castlegate in a horizontal leg off the main bore hole, but due to low gas volumes and high water volumes, the well was recompleted in Wasatch and upper Mesaverde sandstones in the vertical section. The cored interval was recovered from the vertical bore-hole section.

Core analysis shows that the Castlegate and Sego Sandstones have similar lithologies and consist mostly of sandstone interbedded with black bioturbated and carbonaceous shale. Individual sandstones range from very fine-to-fine grained and have low-angle cross-bedding, small ripples, sparse burrows, and moderate bioturbation. The Castlegate was deposited in a marginal marine to lower coastal plain environment, whereas the Sego is a marginal marine deposit.

Twenty-five fractures were identified in core. Most are natural fractures between 2 and 9 inches (8 to 20 cm) long, closed or slightly open with no discernable mineralization. Several appear to be drilling induced and are nearly vertical and very long (~ 2.5 ft [0.75 m]) with no mineralization. Portions of the core illustrating various depositional environments and fracture types will be available for viewing and discussion.