

Sedimentology, petrology, and reservoir quality of the Torok Fm., Brooks Range Foothills, Alaska

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Aptian to Albian age sandstones of the Torok Formation were deposited in the Colville basin. These sands have largely been ignored in past exploration efforts with previous focus being on shallow water facies in the Nanushuk Fm. or younger strata. This study focuses on distal shelf sandstones of the Torok Formation from Arc Mountain, Slope Mountain, Gunsight Mountain, and the Grandstand Test well. At the locations examined I identified 12 lithologic facies. Facies associations define depositional environments ranging from deep marine debris flows and turbidites (distal shelf/slope) of the Torok Fm. through the Torok/Nanushuk transition, characterized by deposition of hummocky cross-stratified (HCS) beds above storm wave base (proximal shelf). Sandstones from these locations are fine grained and include abundant detrital grains of quartz, chert, various lithics, and feldspar. Compositionally these sandstones plot as litharenite to sublitharenite and are derived from a quartzose to transitional recycled orogenic provenance. Visible porosity in the majority of sandstones is absent. Clay and mica minerals make up most of the matrix material. Initial analysis shows that chlorite, mica, kaolinite, and possibly some mixed layer clays are present, but their abundances have not been determined. The high clay and mica content of these sandstones indicate limited reservoir potential in distal shelf settings. These results combined with recent outcrop studies at Chandler River that document thick amalgamated packages of cleaner and coarser grained sandstones in base of slope settings indicate that exploration efforts for the Torok Fm. should focus on depositional settings off the shelf.