

**REGIONAL GEOLOGY AND RESERVOIR POTENTIAL OF THE SCHRADER BLUFF, PRINCE CREEK, AND SAGWON MEMBER OF THE SAGAVANIRKTOK FORMATION (LATE CRETACEOUS TO EARLY TERTIARY), SAGAVANIRKTOK QUADRANGLE, NORTH SLOPE, ALASKA**

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UAF graduate students and FEX set out in 2008 on a collaborative project to investigate surface exposures of the Schrader Bluff (SB), Prince Creek (PC), and Sagavanirktok (SAG) formations along the Toolik, Ivishak and Sagavanirktok rivers located during 2007 reconnaissance by the Alaska Division of Geological & Geophysical Surveys. The goals of the project were to: (i) define the reservoir quality and regional distribution of Late Cretaceous to Early Tertiary Brookian sandstones, (ii) identify sandbody and floodplain geometries, and (iii) assess the hydrocarbon potential of the frontal foothills of the Brooks Range. Results indicate that the SB along the Toolik and Ivishak Rivers consist primarily of shallow-marine coarsening-upward successions with a marine mudstone at the base and a hummocky cross-stratified sandstone at the top. Outcrop samples indicate that porosity and permeability (P&P) of the SB are reduced by compaction/cementation, and that the SB may be an ineffective oil reservoir in this area. Excellent P&P are however preserved elsewhere in the subsurface, especially along the eastern flank of the Colville High where the SB is productive in the West Sak, Milne Point, Orion, and Polaris Fields.

Non-marine PC along the Ivishak River south of the Echooka #1 well is structurally complex, but generally fines-upward from a basal sandy-conglomerate containing wood and logs to interbedded fine-to medium-grained sandstone, siltstone, carbonaceous shale, and coal at the top of the formation. The PC is unconformably overlain by conglomerate/sandstone of the Sagwon Member (SM) of the SAG along the Ivishak River.

Exposures of the PC at Sagwon Bluffs along the Sagavanirktok River and along the east side of the Toolik River are remarkably similar, although more of the conglomerate near the local base of the PC is exposed along the Toolik River. The PC at Sagwon Bluffs is composed of coarse-to fine-grained sandstone, organic siltstone, organic mudstone, carbonaceous shale, and coal. Alluvial architecture at Sagwon Bluffs includes laterally-extensive, meandering sheet-sandstones at least 3 m thick and hundreds of meters wide and ribbon-form sandbodies up to 15 m thick and hundreds of meters wide. Ribbon-form sandbodies interdigitate with or are encased in organic floodplain facies. Sandbodies are isolated from each other by floodplain deposits and display a low-degree of channel interconnectedness. Reservoir characteristics of the PC are excellent with porosities in the 18-30% range and permeabilities locally in excess of 1 darcy. A probable sequence-bounding unconformity separates the SM of the SAG from the PC at Sagwon Bluffs. The PC and SAG at Sagwon Bluffs record the transition from a wet, deltaic environment dominated by meandering rivers, crevasse splays, lakes, and swamps, during PC time to that of an extensive braidplain during SAG time. The SM of the SAG contains medium-to coarse-grained sandbodies encased in pebble-to-boulder

conglomerate along with infrequently exposed finer-grained floodplain deposits. Because of the friable and conglomeratic nature of the SM, representative core plugs were difficult to acquire in the field. Based upon visual inspection and petrography, the SM of the SAG is believed to be an excellent reservoir. Reservoirs of approximately equivalent age are known to be oil-bearing at the Ugnu accumulation on the Colville High.

Several of the sandstones at Sagwon Bluffs are extensively oil stained. Initial results indicate that the oils are light, slightly-to-moderately biodegraded, and derived mainly from Upper Cretaceous source rocks. Key source rock candidates include the Hue Shale and distal portions of the interfingering Seabee Formation. The combination of a pervasive light oil charge and at least three different reservoir intervals suggest that this lightly-drilled area of the North Slope may warrant future hydrocarbon exploration.