Preliminary investigation of petroleum systems, Tuktu-Gunsight area south of NPRA, North Slope, Alaska

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The USGS, in conjunction with the Alaska DGGS, began investigations of petroleum systems from Umiat south to the Tuktu Escarpment during the summer of 1998. The purpose of this work is to understand the petroleum systems of this relatively well-exposed area as possible analogs for potential systems to the north in the National Petroleum Reserve-Alaska (NPRA). Limited time and weather complications forced us to focus on exposures of the Cretaceous Torok Formation and Nanushuk Group in the Tuktu-Gunsight area.

The Torok Formation in the vicinity of Tuktu Bluff is mainly gray mudstone with thin beds of very fine to fine grained sandstones interpreted as turbidites. In a section measured along the south bank of the Chandler River at Tuktu Bluff, the lowermost part of the Torok Formation exposed in this outcrop comprised several cycles of thin-bedded turbidites, many of which exhibited partial Bouma sequences. Some of the turbidite sandstones were moderately oil stained. These lower Torok Formation sandstones may represent the deposits of a turbidite slope-channel suprafan lobe, or a basin-floor fan.

The lowermost exposed part of the Torok Formation in the area of Desolation Creek east of Gunsight Mountain was a section of coarse grained, amalgamated Bouma A turbidites that were heavily oil stained. These sandstones may represent the deposits of a basin-floor turbidite fan, or a turbidite slope-channel sandstone, and may serve as an analog for similar turbidite reservoirs in the Torok Formation of NPRA.

The Nanushuk Group at Tuktu Bluff comprised a series of parasequences characterized by mudstones that graded to shallow marine sandstones. Each parasequence was dominated by sandstones displaying hummocky and swaley stratification. None of the Nanushuk Group sandstones examined in the Tuktu area were visibly oil stained. The uppermost part of the Nanushuk Group comprised km-wide, lenticular multistory conglomerates that represent the deposits of amalgamated low-sinuosity fluvial channels. None of the Nanushuk Group fluvial conglomerates were oil stained.

The occurrence of heavily oil stained sandstones in several sections of the Torok Formation indicates the viability of at least one petroleum system in this area of the central North Slope. Our work has shown that adequate Torok reservoirs exist in this part of the North Slope, that liquid hydrocarbons migrated into, and were reservoired in, turbidite sandstones of the Torok Formation. This may be useful as an analog for a similar situation to the north in the Planning Area of NPRA. At this time geochemical analyses are being performed on samples from the oil-saturated intervals. The results may help with potential correlation of these oils with those of the Umiat oil field and known source rocks in this area.

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