# Lithofacies, Age, and Geochemistry of the Otuk Formation (Triassic) in the Red Dog District, Northwest Alaska

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A complete penetration of the Otuk Fm. in continuous drill core (DH 927) from the Red Dog District illuminates the facies, age, source rock potential, and isotope stratigraphy of this unit in northwest Alaska. The section, in the Wolverine Creek plate of the Endicott Mountains Allochthon, is ~82 m thick. It gradationally overlies undated gray siliceous mudstone of the Siksikpuk Fm. and underlies undated black organic-rich mudstone of the Kingak(?) Shale. Shale, chert, and limestone members of the Otuk are recognized in DH 927 but the Blankenship Member is absent. The lower (shale) member consists of 28 m of variegated, silty shale with up to 6.9 wt % TOC; thin limy layers near the base contain bivalve fragments (*Claraia* sp.?) consistent with an Early Triassic (Griesbachian-early Smithian) age. Gray radiolarian chert dominates the middle member (25 m thick) and yields radiolarians of Middle Triassic (Anisian, Ladinian) and Late Triassic (Carnian-Norian) ages; a distinctive, ~2.5-m-thick interval of black shale and calcareous radiolarite ~6 m below the top has 9.8 wt % TOC. The upper (limestone) member (29 m thick) is lime mudstone with monotid bivalves and late Norian radiolarians, overlain by gray chert that contains the first Rhaetian (latest Triassic) radiolarians recognized in the Otuk. Rare black shale interbeds have up to 3.4 wt % TOC. Regional correlations indicate that Otuk lithofacies vary with both structural and geographic position.

A suite of $\delta^{13}C_{org}$ isotope data (n=38) from the upper Siksikpuk Fm. through the Otuk Fm. and into the Kingak(?) Shale in DH 927 shows a pattern of positive and negative excursions similar to those reported elsewhere in Triassic strata. In particular, a distinct negative excursion at the base of the Otuk (from -23.8 to -31.3) likely correlates with a pronounced excursion that marks the Permian-Triassic boundary at many localities worldwide. Another feature of the Otuk $\delta^{13}C_{org}$ record that may have a global correlative is a series of negative and positive excursions in the lower member. At the top of the Otuk in DH 927, the $\delta^{13}C_{org}$ isotopic compositions are extremely depleted and may correlate with a negative excursion widely observed at the Triassic-Jurassic boundary.