

## **Alaska Burger Prospect Evaluation – Insights From Geochemistry**

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### **ABSTRACT**

The Burger-J well was drilled in 2015. The 1989-90 Burger-1 discovery well encountered gas condensate with residual oil saturations. The Burger- J well was drilled to test the oil rim in the Beaufortian Kuparuk-C and A sands. High quality reservoir was found, but was wet with 15-20% light residual oil. No shows were reported at the wellsite during drilling, though several sidewall cores were described as having weak fluorescence. Gas chromatography of side wall cores indicated presence of light oil. A geochemical evaluation program was carried out to understand the prospect hydrocarbon charge history. This program consisted of mud gas evaluation, headspace gas analysis from side wall cores, fluid inclusion stratigraphy, core extract geochemistry, and repeat analysis of old samples. Isotopic data from Burger-1 and Burger-J are similar and consistent with Shublik Formation source. Burger-1 condensate is more mature in light hydrocarbons. Lean fluid compositions at Burger-1 are probably the result of mixing of late mature gas-rich HC-pulse and/or gas cap expansion. Integration of geochemical analyses with geological interpretations suggests at least three episodes related to a complex structural history of the eastern Chukchi Sea of hydrocarbon migration into Burger: 1) Late Cretaceous: Formation of the Central Chukchi Anticlinorium, a regional inversion structure that included a “proto” Burger closure. Black oil sourced from the Shublik Formation was emplaced into proto-Burger. Crestal trap failure led to loss of some or all oil. Residual black oil seen in Burger 1 is from this phase. 2) Paleocene: Second charge from the Shublik in the peak-oil window into Burger 1 and Burger J after the structural collapse of the Chukchi Anticlinorium and Paleogene burial. This phase is supported by the robust isotope correlation between the liquid hydrocarbons at Burger-1 and Burger-J. 3) Eocene: Uplift and tilting event documented beneath the North Slope is also interpreted beneath the Chukchi Sea. This event led to the activation of normal faults related to the structure’s initial collapse and spillage of the oil rim. This interpretation is supported by the coincidence of the modern Gas Water Contact and the intersection of two primary fault trends. Gas charge (accompanied by gas cap expansion?) continued into the Burger structure after the establishment of the present fault and spill point configuration. Only condensate gas with residual oil is found currently in Burger J.