Molecular Geochemistry of the Shublik Formation: New Insights for Arctic Alaska Energy Resources

I. YURCHENKO[1] AND J.M. MOLDOWAN[1,2]

[1]Stanford University, Stanford, CA 94305, USA, inessa@stanford.edu

[2]Biomarker Technologies, Inc., Rohnert Park, CA 94928, USA, jmmoldowan@biomarker-inc.com

Arctic Alaska is one of the world's largest hydrocarbon-rich provinces. It has been widely recognized that crude oil accumulations in the North Slope of Alaska commonly represent a mixture of oils derived from several source rocks, however the Triassic Shublik Formation is considered to be the major source rock for oil in the North Slope and main contributor in the giant Prudhoe Bay field [1,2].

The Shublik Formation is a laterally and vertically heterogeneous unit that has been described both in outcrop and in the subsurface. Its sediments are characterized by carbonatic, glauconitic, phosphatic, and organic-rich lithofacies interpreted to have been deposited under fluctuating oceanic upwelling conditions [3]. Recent studies of Arctic Alaska oils by Peters *et al*. [4] and Wang *et al*. [5] used decision-tree chemometrics of selected source- and age-related biomarker ratios that helped to classify Shublik oil samples into two different genetic families linked to carbonatic and shaly organofacies of the Triassic Shublik source.

This work focuses on Shublik source rock geochemistry and oil-source rock correlation. Organic geochemical studies involve source rock screening methods, analyses of biomarkers and diamondoids [6] that include quantitative diamondoid analysis, quantitative extended diamondoid analysis, and compound specific isotope analysis of diamondoids. Biomarker ratios of the source rock extracts provide core-based understanding of the Shublik source rock environment of deposition, and lithofacies distribution, while diamondoid-based methods reveal essential information for high-maturity source rock extracts as well as oil-source rock correlation. Knowledge of Shublik organic facies and source rock properties distribution is essential for future exploration and development of the Arctic Alaska region.

[1] Masterson (2001*) PhD thesis*, 222 p. [2] Peters *et al*. (2008) *Org. Geochem*. **39**. [3] Parrish *et al*. (2001) *SEPM Core Workshop* **21**, 89–110. [4] Peters *et al*. (2007) *AAPG Bulletin* **91**, 877–913. [5] Wang *et al*. (2014) *AAPG Bulletin* **98**, 1235–1267. [6] Moldowan *et al*. (2015) *J. Pet. Sci. & Eng*. **126**, 87-96.