

## **Kaybob versus Willesden Green - the Duvernay Showdown: Rock Composition Variability and Implications for Completion**

**Raphael A.J. Wust<sup>1</sup>, Nicole Willment<sup>1</sup>, and Brent Nassichuk<sup>1</sup>**

<sup>1</sup>Trican Geological Solutions Ltd., Calgary, Alberta, Canada

### **Abstract**

The Devonian Duvernay Formation was deposited at equatorial latitudes in a relatively protected shallow shelf area, surrounded by active carbonate reefs and platforms. The black shale deposits, now famous for their unconventional gas/liquids production potential, formed in a region with warm surface waters and normal bioproductivity along with anoxic bottom waters resulting in high organic matter preservation. Due to the paleogeographical setting and the presence of major reef complexes, the Duvernay Formation contains both quartz-rich and carbonate-rich intervals. In the Kaybob area, quartz-rich shales dominate while in the southwestern part of the basin, in close proximity to large reefal structures, carbonate-rich units are more common. Here we look at the mineralogical rock variability in the two areas where exploration is currently targeted, Kaybob and Willesden Green. Marked compositional variability is observed both downhole and laterally across the regions and this variability can have major implications on porosity, permeability and fracture design. The original biological and mineral compositions have undergone major transformations and neoformations during burial and basin uplift. Detailed examples will be shown using selected cores and implications for completions will be discussed.