

## **Organic Petrography of the Ordovician Red River Kukersite Tight Oil and Gas Play, Williston Basin, North Dakota, U.S.A.**

**Wayne K. Camp<sup>1</sup>, Juergen Schieber, Maria Mastslarz, and Timothy O. Nesheim**

<sup>1</sup>Retired, Anadarko Petroleum

### **Abstract**

An organic petrographic study was conducted to supplement previously published geochemical data as part of an evaluation of a conceptual Upper Ordovician kukersite tight oil and gas play in the Williston Basin, North Dakota. The kukersite interval of the lower Red River member is an organic-rich (average 3.8 wt% TOC) dolomitic limestone that has been documented as the source rock for hydrocarbons produced from porous dolomite zones in the overlying upper Red River member in conventional structural and stratigraphic traps. Basin modeling studies of the Red River petroleum system suggest that only a small fraction of the generated petroleum has been produced from the conventional fields, and that a significant resource may remain trapped within low permeability carbonates associated with the kukersite source rock in the lower Red River member. The maceral composition of the kukersite is predominately oil-prone algal and amorphous kerogen where thermally immature (bitumen reflectance (BRo) <0.30% BRo) that grades to 100% solid bitumen by 0.63% BRo and pyrobitumen at BRo > 1.5%, and completely fills the mineral interparticle pore space in the studied samples. Only a few nanopores were observed in the organic matter by SEM examination, including the gas mature samples (up to 3.50% BRo). The organic matter in the thermally mature samples often exhibited a volatile response when probed by the electron beam, indicating that the general lack of observed organic matter pores may be due to the presence of altered residual oil.

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