A Characterization of the Pebble Shale Unit and Lower Hue Shale within the Northeast Brooks Range, Alaska: What's with the High Radioactive Zone?

Dolores A. van der Kolk,¹ Rainer J. Newberry,² Michael T. Whalen,³ and Marwan A. Wartes⁴

¹Geology and Geophysics, University of Alaska Fairbanks, Natural Science Facility Rm. 308, 900 Yukon Drive, Fairbanks, AK 99775-5780, (ftdav@uaf.edu)
²Geology and Geophysics, University of Alaska Fairbanks, Natural Science Facility Rm. 308, 900 Yukon Drive, Fairbanks, AK 99775-5780, (ffrn@uaf.edu)
³Geology and Geophysics, University of Alaska Fairbanks, Natural Science Facility Rm. 308, 900 Yukon Drive, Fairbanks, AK 99775-5780, (mtwhalen@gi.alaska.edu)
⁴Energy, Alaska Division of Geological and Geophysical Surveys, 3354 College Road, Fairbanks, AK 99709, (marwan_wartes@dnr.state.ak.us)

Cretaceous starved basin shale serves as both the cap rock to the Prudhoe Bay oilfield and a potential source for K-T hosted oil and gas in Northern Alaska. The contact between the lower part, the pebble shale unit (PSU), and the higher part (Hue Shale), is drawn at the base of the ‘high radioactive zone’ (HRZ). Although widely employed, the origin and variability of the HRZ is unknown. Three sections were measured along the Canning River, a tributary of the Katakturuk, and along Marsh Creek.

XRF results from the upper pebble shale and lower (?) Hue Shale at the Canning River Section show that there are two separate reducing trends, likely caused by different processes: (1) primary reduction during deposition, and (2) reduction due to a secondary process that remobilized trace metals from felsic volcanics. Silicification of glendonites (calcite pseudomorphs from ikaite) and concretions of varying sideroplesite, ankerite, and calcite mineralogies suggest that hot fluids migrated through the Canning River and nearby PSU localities.