

Nature's Acid Job: The Diagenesis of the Lower Watrous (Red Beds) Sandstone Reservoir at Manor Pool, southeast Saskatchewan

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The Lower Watrous (Red Beds) sands have proven to be an economic hydrocarbon resource at Manor Pool (TWP 7, 8 RGE 1W2) since the advent of horizontal drilling. Reservoir development is directly related to reduction within the Lower Watrous sands. The normally red iron oxide coatings on the sand grains have been reduced in the reservoir and appear green in colour. Work by Surdam, et al (1993) suggests that the reduction of iron oxides in Red Beds results when iron oxide (+ sulphate) oxidize the hydrocarbons to oxygenated organic compounds (acetic acid). These acids dissolve carbonates to enhance the porosity by up to 14%.

The Manor Pool area has two productive reservoir sands: P-1 (upper) and P-2 (lower). Only the P-1 sand is represented in our core display. The Manor Pool is situated in a structural low on the Mississippian unconformity surface (Musial, 1995). The hydrocarbons were sourced from the underlying Mississippian Alida Beds. The dolomite caprock that normally separates the Lower Watrous from underlying Mississippian carbonates is absent here. Barchyn (1982) suggests a dominant horizontal component for the fluid flow between the Mississippian carbonates and Lower Watrous (Amaranth) in the Waskada-Pierson Area of southwest Manitoba.

The P1 sandstone varies from lightly oil stained and asphaltene-rich sands to totally oxidized red sandstone. The carbonate was sourced from eroded Mississippian rock and ultimately dissolved by its oil.