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Nemaha
4-10-6E

May 21, 2002

Mr. H. Jerry Hodgden
Hodgden Oil Company
408 18th Street
Golden, CO 80401-2433

Dear Jerry:

I had your logs long enough on the Kinney#1-6 King in Nemaha County and tried to think of something intelligent. My colleague, Bill Guy, put the resistivity and density-neutron logs into PfEFFER software and made a Pickett crossplot. We related this to the other logs, tests, and your sample description. I divided the Simpson Group into several sedimentary packages/cycles based on what I recall from the study where I correlated cycles from core to the corresponding well log (OGS publication that you have). I called the units A through F, from bottom to top and labeled the neutron-density log. I did not try to correlate these cycles into any kind of framework with nearby logs or the previous study. As we agreed, building such a stratigraphic framework would make a good M.S. thesis. I also noted your hematite and glauconite bearing interval, cycle B below the lower Simpson sand. Well start with this interval, cycle B.

Cycle B (3642-3663' log depth) is shalier and more silty based on the gamma ray and your description. The density/neutron still indicates quartzose lithology so its not too shaly. The cycle lies immediately above a very dense shale which to indicates a hematitic rich interval. This is the anomalous rock that Berendsen and Doveton document near or on paleohighs. As you reside on Precambrian, you are relatively high. Locally, that's another story.

Cycle B exhibits microlog separation which to me indicates permeability. You also have a very good drilling break. However, interval had limited cut/fluorescence/show at top of interval and no DST was taken. The 12-14% porosity and 100 ohm-m indicates low Sw ~28% if no shale correction is needed. Sonic porosity is similar to density-neutron further persuading me that the zone has 12+% porosity. I don't think that hematite or glauconite are affecting the porosity, i.e. density porosity would be lower. Gamma ray my be a little higher due to the hematite (thorium content) and glauconite (potassium content). Cycle B plots just to left of the lower Simpson sand and both zones look good on the Pickett crossplot. Might cycle B be underpressured so show as limited? That brings us to cycle C, or the Lower Simpson Sand.

The lower portion of cycle C, labeled as such, is a bit perplexing. As mentioned above its trajectory and location on the Pickett crossplot indicate a pay zone from the looks of things. Points cluster around 20% Sw using an Rw of 0.268. BVW is also low indicating moderate sized pores. The trend of points above the zone parallel water saturation of 30% and increasing BVW

suggesting a fining upward succession. However, given all this, there is no microlog separation and test shows interval to be tite while sample shows were noted. Interesting... I don't know what else to say. Might underpressuring be an issue where perhaps fines reduced permeability around the well?

The upper part of cycle C, the Upper Simpson Sand, has sample shows, but the DST is tite. There is no separation on microlog. Porosity values are insufficient for permeability. The Pickett cross plot shows clustering at low porosity below the clustering formed by the lower zones. All indicators suggest that this zone is tite.

Cycle D is an entirely carbonate cycle, looks like limestone from the log and your sample descriptions. This cycle is inferred to reflect continued deepening of the cycles until offshore carbonate dominates the cycle.

The hematite suggests near shoreline conditions at top of cycle A, above the Precambrian surface and at the base of cycle B, prior to sea level rise. I divided cycle C into an upper and lower section. These upper and lower intervals may be separate cycles, albeit thin ones. Sea level rise and fall is inferred to have created the cycles with lowstands of sea level defining boundaries. Overall sea level generally rises progressively up through the cycles into the Viola Limestone, where the shelf is eventually drowned and the source of the sand is eliminated. The tap into the sand supply is lost in cycle D. Cycle A is an exception where it is dominated by dolomite.

I don't know how helpful this is. It is my guess that the B and C cycles may be locally productive. I am not sure if this would be landward from where you are now to get thicker and more porous/permeable sand development. The structure may be very localize and you can't go farther updip. Is there any indication of more sandstone in that direction. Are the same cycles present updip compared to McClain? The sand deposition may terminate at the shoreface since aeolian deposits may not be so widespread in this area, compared to the south. These are just idle speculations.

Let me know what happens up there.

Sincerely,

Lynn Watney

Cc: Bill Guy

Enclosures