The Impact of Post Oil Emplacement Tectonics of the Delaware Mountain Group, with an Emphasis on Residual Oil Zone Potential

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The impact of oil emplacement tectonics in developing traps/fields in the Cherry Canyon Formation of the Delaware Mountain Group, is well understood. Unfortunately, the presence of intervals which produce only water, but with similar oil saturation to producing fields, have also been documented. Many of the pseudo-fields are actually the locations of the traps charged with oil and gas prior to late stage tectonics. These pseudo-fields are now potential residual oil zones (ROZ) enhanced oil recovery (EOR) "Greenfields".

During early Cherry Canyon time, the depocenter of the Delaware Basin was located along the southwest margin of the basin, north of the Apache and Davis Mountains. The slope of the basin floor at that time was on average a 1° dip to the southwest thought this AOI. The Laramide, and the Basin and Range tectonics have resulted in +/- 5000' of uplift to the west and a "tilt" of the basin to the east. This resulted in a re-equilibration of oil, gas, and water in the submarine fan complex channel in the Delaware Mountain Group.

We obtained digital well logs along with well and production data for 200 wells from a commercial database. Using a commercial software package, a petrophysical model was built to test the Greenfield hypothesis. Correlations of the ORS permitted the generation of gross and net isopachs of the channel sands. These maps determined the location of present day reservoirs, as well as identifying Paleo-Traps with Residual Oil Zone CO2 Enhanced Oil Recovery opportunities. Using the Haversine for

mula and law of sines, calculations on the spatial distance between surface-hole locations and depending on that distance, the pre-tectonic measured depth of the Cherry Canyon Formation was derived. A map of the pre-Laramide tectonic structure of the Cherry Canyon was then created, based on the study and other work in the area, they hypothesis that late tectonism has resulted in the re-equilibration of traps within the sand channel complexes and that an emphasis on CO2 EOR in the ROZ in lower Cherry Canyon Formation is plausible

Using 4 core and petrophysical logs from the lower Cherry Canyon Formation, ORS or organic rich Siltstones, were identified and found to be highly correlatable across northeastern Culberson and northwestern Reeves counties. This study also found that the thickness and reservoir quality of sands in the lower Cherry Canyon were highly variable. The study focused on the distribution of calcite cement in the reservoir sandstones and determined that the calcite cements had only minor impact on reservoir quality. The 4 sand intervals studied represented the pay intervals in the West Ford (4100), West Geraldine, and Ford Geraldine Fields.