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WHY MANY “CONDEMNED” OVERPRESSURED PETROLEUM RESERVOIRS SHOULD BE RE-EXAMINED!

Most commercial oil sands exhibit shale resistivity ratios (ratio of normal R_{shn} to observed R_{sho}) of less than ≈ 1.6 in adjacent shales and can be reached without an expensive string of protection pipe. On the other hand, many experts claim that “no commercial production is found when the shale resistivity ratio reaches and/or exceeds 3.5.” Such wells are often highly productive initially and are characterized by extremely fast pressure depletion.

Based upon extensive rock compaction studies, the writers believe that the latter is due to plastic deformation (irreversible compaction) in undercompacted overpressured rocks with increasing effective stress, soon after production is initiated (during well tests, for example). Thus, well tests could be quite misleading.

Effective stress (grain-to-grain stress), p_e , is equal to the total overburden pressure, p_t , minus the pore (or fluid) pressure, p_p [$p_e = p_t - p_p$]. It is the *effective* stress that causes compaction.

In conclusion, in the opinion of the writers, many erroneously condemned overpressured reservoirs should be reexamined.