World Academy of Science, Engineering and Technology
International Journal of Geological and Environmental Engineering
Vol:18, No:03, 2024

Best Practical Technique to Drain Recoverable Oil from Unconventional Deep Libyan Oil Reservoir

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Abstract : Fluid flow in porous media is attributed fundamentally to parameters that are controlled by depositional and post-depositional environments. After deposition, digenetic events can act negatively on the reservoir and reduce the effective porosity, thereby making the rock less permeable. Therefore, exploiting hydrocarbons from such resources requires partially altering the rock properties to improve the long-term production rate and enhance the recovery efficiency. In this study, we try to address, firstly, the phenomena of permeability reduction in tight sandstone reservoirs and illustrate the implemented procedures to investigate the problem roots; finally, benchmark the candidate solutions at the field scale and recommend the mitigation strategy for the field development plan. During the study, two investigations have been considered: subsurface analysis using (PLT) and Laboratory tests for four candidate wells of the interested reservoir. Based on the above investigations, it was obvious that the Production logging tool (PLT) has shown areas of contribution in the reservoir, which is considered very limited, considering the total reservoir thickness. Also, Alcohol treatment was the first choice to go with for the AA9 well. The well productivity has been relatively restored but not to its initial productivity. Furthermore, Alcohol treatment in the lab was effective and restored permeability in some plugs by 98%, but operationally, the challenge would be the ability to distribute enough alcohol in a wellbore to attain the sweep Efficiency obtained within a laboratory core plug. However, the Second solution, which is based on fracking wells, has shown excellent results, especially for those wells that suffered a high drop in oil production. It is suggested to frac and pack the wells that are already damaged in the Waha field to mitigate the damage and restore productivity back as much as possible. In addition, Critical fluid velocity and its effect on fine sand migration in the reservoir have to be well studied on core samples, and therefore, suitable pressure drawdown will be applied in the reservoir to limit fine sand migration.

Keywords : alcohol treatment, post-depositional environments, permeability, tight sandstone
Conference Title : ICGG 2024 : International Conference on Geology and Geophysics
Conference Location : Istanbul, Türkiye
Conference Dates : March 11-12, 2024