J Pet Environ Biotechnol 2017, 8:3(Suppl)
DOI: 10.4172/2157-7463-C1-032

From time, magnitude and type of basin structures to petroleum exploration targets

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Most of the oil and gas have been found in Mesozoic and Cenozoic basins. The most important factor that controls oil and gas accumulation is the structure/tectonics. It can be summarized as three important themes in the studies of structural geology for oil and gas exploration. The first one is the time/period of the tectonism or crust movement happened in the basin evolution. For the basins which have gone through several stages of structural evolution, the Mesozoic/Cenozoic one is of more importance. For example, from Precambrian to Cenozoic, Tarim basin (Northwest China) have five stages of basin development. We believe that the Cenozoic structural movement is vital to its oil and gas accumulating. The second one is the magnitude or the intensity of the structural movement/tectonism. The bigger the magnitude, the better the richness of oil and gas. Jiuxi depression (Northwest China) may be served as a good example, the oil mainly exists in its southern faulted fold belt. The third theme is the type of the structures. In extensional and strike-slip basins, the pull apart structures control the oil and gas distribution. In compressional basins, large uplift belt and large fault belts are still prospective domains for petroleum industry. Of large uplift belts, the deep buried carbonate rocks which have a great amount of fractures and Karst caves are of special interest. In such area, more attention should be paid to the extensional structures and the transitive zone between different structural belts. There are still many oilfields to be found today and in the future. Time, magnitude and type of basin structures are fateful for petroleum exploration targets.

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Volume loss modeling for lost circulation, Hartha formation, South Rumalia Field, Iraq

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Wells drilled in Rumaila field are highly susceptible to lost circulation problems when drilling through Hartha formation. This paper presents a comprehensive statistical work and sensitivity analysis models of the lost circulation events for more than 75 wells. Moreover, this study will demonstrate an integrated analysis regarding the most significant drilling parameters, which have pivotal impact on the lost circulation to provide the greatest chance of mitigating or avoiding lost circulation in Hartha zone. Lost circulation events are extracted from daily drilling reports, final reports, and technical reports. Key drilling parameters are analyzed using statistical software to understand the relationship between the mud losses and various drilling parameters such as MW, ECD, Yp, ROP, SPM, RPM, WOB, flow rate, and bit nozzles. The sensitivity analysis is conducted to examine the impact of each parameter in all models using Frontline Solver software. In addition, variance inflation factor method is used to test for the multicollinearity phenomena in each model to maximize the accuracy and to obtain a solid mathematical model. The volume loss model is conducted to predict lost circulation in Hartha formation. As a proactive action, this model can be used to estimate the volume loss model prior drilling Hartha zone. Observations that have been made from the volume loss model are MW, ECD, and Yp have a significant impact on lost circulation respectively; however, SPM, RPM, and ROP have a minor effect on the volume loss model. Equivalent circulation density model is obtained to estimate ECD in Hartha zone, and from this model can be deduced that MW, ROP, and Q have a significant impact on ECD respectively; nevertheless, RPM and Yp have a minor impact on the ECD. Rate of penetration model is made to estimate ROP in Hatha formation. It is concluded that WOB, SPM, and RPM have a significant impact on the ROP respectively, but MW, ECD, and Yp have a minor influence on the ROP. In addition, engineering solutions are developed to give a clear image regarding lost circulation, and it will provide a unique statistical study and coherent sensitivity analysis of all factors which have an essential or a small impact on this issue.

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