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MANAGEMENT AND PREDICTION OF SAND AND FINES PRODUCTION

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The petroleum industry has drifted from the traditional sand control to what is termed sand management. Sand management is an operating concept where traditional sand control means are not normally applied and production is maximized and maintained through monitoring and control of fluid rates, well pressures and sand inflow. Sand control involves high cost and low risk solutions while sand management represents low costs solutions but active risk management. Over 70% of the world's oil and gas fields employ sand management when making field development decisions.

Knowing the reasons behind sand production from a reservoir and/or being able to predict sand production is always the first right step to take towards sand management. The cause of sand production

usually either has to do shear failure of the rock matrix due to pressure depletion or tensile failure of the individual sand particle disintegrated from the parent rock as a result of fluid flow through the rock matrix.

Prediction of Sand and Fines Production

It is difficult to successfully predict sand production in a wells' exploitation phase using only one method of prediction. Several methods are considered to achieve optimal prediction accuracy. Hong'en, et al. (2005) described five empirical methods of predicting sand production: interval transit-time method, combination modulus method, Schlumberger method, porosity method and bottom-hole pressure control method.

Interval Transit-Time Method

Forecast of sand production can be done using acoustic logging data of formation. A critical interval transit-time value, 295 $\mu s/m$ is defined, such that if Δt is more than this value, then the well is most likely going to produce sand and vice-versa. However this value is slightly different for different oil fields.

Combination Modulus Method

Numerous analyses on statistical results of oil well sand production show that no sand is produced when elastic combination modulus (EC) is more than or equal to 2.88×10^6 psi, light sand is produced when EC is between 2.16×10^6 psi and 2.88×10^6 psi, and great sand is produced when EC is less than 2.16×10^6 psi.

Schlumberger Method

In the Schlumberger method, $ES\times EB$ is calculated. It is a function rock porosity, Poisson ratio and interval transit time. It is suggested that no sand is produced when $ES\times EB$ is more than 5.51×10^9 psi and sand is possibly produced when $ES\times EB$ is less than 4.79×10^9 psi.

Porosity Method

The porosity of a formation could also be a determining factor in deciding if sand production will occur or not. The possibility of sand

production is higher if porosity exceeds 30%. Slight sand production could happen for porosity within the range of 20% to 30%.

Bottom-hole Pressure Control Method

Researchers of former Soviet Union put forward bottom-hole pressure control method and proposed that formation stability near wellbore is related with not only formation properties but also bottom-hole pressure. This is based on conditions that tangential stress on bottom formation is less than cementing force of the rock particle in order to prevent sand production.

Conclusion

It is also actually theme about sand and fines transport in tubing: vertical and horizontal flow and sand erosion. To avoid of this it has to use the separation on the seabed.

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