

Formulation of water-based drilling fluids with ornamental stones waste for exploration of the pre-salt carbonate rocks and mature fields

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Drilling muds play a crucial role in the success and safety of oil and gas drilling operations, especially when it comes to harsh environments of high temperature and high pressure, such as the Pre-Salt carbonate reservoirs in Brazil. The operations at these conditions are a challenging task where a suitable mud composition is decisive for the drilling process efficiency and feasibility, as well as to restrain environmental issues. Water-based muds (WBM) are the most environmentally friendly drilling fluids, besides having the lowest cost in comparison to conventional oil-based fluids. WBM properties are enhanced by using additives such as bentonite mud and polymers, becoming suitable for different environments according to their additives. Drilling activity itself is expensive, thus, any possible reduction in drilling costs must be done. Ornamental stone industry is as important economic activity worldwide and the stones benefiting process generates a great amount of waste (millions tons annually), whose final destination costs a lot for stone industry. The waste mud properties are interesting as thickeners in bentonite partial or total substitution, and its use as drilling fluid additive could be a great alternative for both industries, since it would be available for petroleum industry for a minimum cost. In this regard, the ornamental stones waste will be studied as a substitute for bentonite, as well as the use of diutan gum as a biopolymer additive and its effects on fluid rheological and thermodynamic properties. The obtained drilling parameters will be applied in Bourgoyne and Young ROP model and the results will be statistically analyzed. Also, the financial and economic analysis will indicate the cost feasibility of bentonite substitution.