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Commentary

Drilling Fluids Engineering Operations in Weighting Agents

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DESCRIPTION

Due to the high cost of barite-based drilling fluids, vigorous attempts have been made to replace barite with new competing ores and titanic reserves as an alternative weighting material to overcome formation pressure problems. This approach involves studying the effects of the first used thin layer iron ore (hematite barite), which was discovered in vast reserves as an unprecedented weighting agent in drilling fluids. Several drilling mud samples were prepared and filled with barite and Delaminated Iron Ore (DIO) to achieve the same mud density range (9.6 to 18.7 lb/gallon). The rheological properties of Water-Based Mud Samples Treated with DIO (WMSDIO) were investigated and showed excellent rheological behavior as an alternative to barite-weighted mud. The sludge cake thickness and fluid loss were investigated. The observed results confirmed that DIO has new potency as a weighting material in drilling fluid operations.

Mud additives used in the upstream oil and gas industry are in constant demand to provide sufficient hydrostatic pressure to remove drill cuts and ensure wellbore stability during drilling operations. Weighting equipment allows operators to change slurry density to maintain high formation pressure. Weighting materials also play an important role in reducing cement permeability, preventing strength loss, and controlling settling and gelation. Barium sulfate, recognized as barite, is a major weighting agent, but there is a need to expand the use of local materials in the mud industry to minimize barite use. As drilling activity is expected to increase, alternative sources of drilling mud additives should be sought to minimize or eliminate imports of weighting materials such as barite. Many suitable materials are being investigated for use as alternative weighting substances to barite *via* the drilling fluids industry to improve oil and gas recovery. Drilling fluids are formulated to have an adequate hydrostatic head, typically in the range of 250 to 450 psi above formation pressure, to prevent well blowout. An imbalance between formation pressure and hydrostatic pressure can cause formation fluids to flow, which can be environmentally friendly when disposing of drilling fluids. As the weight of the fluid increases, the hydrostatic head increases, thus decreasing the Rate of Permeability (ROP). Results documented in a recently investigated study show that nanosilica particles can increase drilling mud cake density, reduce shale permeability and retard pressure transitions while improving water-based mud lubrication and rheology. In addition, its ductility under pressure and temperature allows it to be used as a filter reducer, creating strong filter cakes and plugging microslots in drilled formations. Shorter drilling times due to faster penetration speeds reach the target faster, reducing overall drilling costs. Rheological properties are investigated and compared with those of barite.

The alternative ores used were tested at various temperatures to realize their prospects for use as weighting agents in drilling mud technology. The solid content, rheological properties and density of the analyzed samples were investigated. An alternative source of weighting material that can be used in place of barite can be called a new regeneration in drilling mud technology. Mixtures of barite and limonite have been used by some researchers as an alternative weighting material to barite. The tested rheological properties of this mixture ensure comparable behavior to barite, with the advantage of being used as an alternative weighting material. In addition, galena is being investigated for use as an alternative weighting agent in drilling mud engineering operations.

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