NON-POLYMERIC PERMANENT CLAY STABILIZER FOR SHALE COMPLETIONS

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ABSTRACT

Many studies have been performed to identify chemical additives that will aid shale stability in large volume slick water fracturing treatments. Most of the targeted shale formations have a very low permeability, do not experience conventional leakoff and do not contain high amounts of swelling clays such as smectite, leading to a perception that the shale is not water sensitive. However, recent laboratory evaluations have shown that not all shales are stable in fresh water, destabilizing with fresh water contact and releasing fines which could potentially result in formation damage and reduce net fracture pack conductivity.

Previous studies of the ability of inorganic salts, temporary clay stabilizers, and permanent polymeric based clay stabilizers show that some of the common hydraulically fractured shales encounter stability problems when contacting fresh water. The studies have revealed that cationic polymeric permanent clay stabilizers improve the stability of the water sensitive shales. However, polymeric shale stabilizers are not without potential detriments. Polymers can lead to formation damage by blocking pore throats and reducing permeability. Additionally, the use of cationic polymers can limit the use of other chemical compounds used in treating fluids that may not be compatible with the cationic charge.

This paper will compare a non-polymeric permanent clay stabilizer to conventional cationic polymers, temporary clay stabilizers, and inorganic salts and demonstrate equivalent and, sometimes, improved performance. Laboratory data from shale stability (roller oven), capillary suction time (CST), and regained permeability (core flow) studies will be presented demonstrating the efficacy of this new compound. Shales selected for the study will include standard Pierre shale and a variety of commonly hydraulically fractured shales from North America. Additionally, chemical compatibility testing will demonstrate the benefits of the new compound over conventional cationic polymeric clay stabilizers.

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