Cla-Web™ Clay Damage Control Additive for Low Permeability Formations
Provides Improved Clay Damage Protection and Enhanced Environmental Performance

Clay swelling, dispersion and migration due to water-sensitive clay minerals in the producing formation can substantially reduce permeability of formation sands and proppant packs resulting in greatly reduced well productivity.

New Cla-Web™ agent is a liquid clay stabilization additive that can be applied in hydraulic fracturing treatments. It offers a highly effective alternative to common KCl (potassium chloride) substitutes.

**Customized for Low Permeability Formations**
In addition to temporary clay stabilization during the treatment, Cla-Web agent provides long-lasting clay stabilization in low permeability formations. The Cla-Web agent molecule is very small and is able to enter the matrix of low permeability formations like tight sand and shale. The molecule is ion-exchange resistant rendering treated clay minerals insensitive to water, preventing clay swelling and dispersion.

Cla-Web agent works by a mechanism similar to that of proven Cla-Sta® FS and Cla-Sta XP agents which are optimized for moderate-to-high permeability formations. The agents work by adsorbing on formation surfaces, altering the surface properties of the clay particles and reducing their interaction with flowing fluids even at high flow rates.

**Cla-Web Service Performance Improvements**
In low permeability formations, Cla-Web service provides several performance improvements compared to current widely used KCl substitutes:

- Superior performance at a lower concentration compared to competitive KCl substitutes.
- Improved environmental characteristics (not classified as a hazardous material under 49 CFR Part 173 – Subpart D or under the United Nations Recommendations).
- Renders water swelling clays insensitive to changes in water salinity resulting in excellent sustained permeabilities.
- Can be batch mixed or metered on-the-fly as a liquid additive to eliminate the time often required in dry mixing of solid salts to prepare a brine solution.
- Applicable over a broad bottomhole temperature range from 50 to 500°F (10 to 250°C).

Cla-Web agent performance has been demonstrated through the capillary suction time (CST) test method which is commonly used to compare KCl substitutes used for temporary clay control additives. These charts present results of testing on sandstones. Note that Cla-Web agent shows excellent performance at low concentrations.

**Figure 1** — Capillary suction time (CST) testing is one method used to compare the effectiveness of widely used temporary clay control additives. These charts present results of testing on sandstones. Note that Cla-Web agent shows excellent performance at low concentrations.
Long-Term Protection with Cla-Web Agent

Core and sand pack testing demonstrate that Cla-Web agent is an effective clay stabilizer by its ability to render water-sensitive clay insensitive (Figure 2). This means that variation in the ionic content of water will not cause clay swelling or dispersion which reduces the concern over matching fracturing treatment water to formation water and the possible mixing of water produced from various horizons.

Cla-Web Service Design Optimization

Designing an optimized Cla-Web service treatment requires identifying the types of clay minerals present in the formation and their relative concentrations. This is normally done by petrographic, x-ray, scanning electron microscopy (SEM) and energy dispersive x-ray (EDX) analyses.

Core testing provides the most authoritative data upon which to base recommendations provided a sufficient number of core samples is available to statistically represent the formation.

CST testing provides a rapid and inexpensive method to help optimize a treatment for low to moderate water sensitivity. It requires a small amount of formation material, enabling the use of drill cuttings or core sample fragments. In addition, it provides a method to compare competitive products.

Application of Cla-Web agent in highly water sensitive formations will require additional information to design an appropriate treatment. Some typical information required includes the clay concentration, clay identification, cation exchange capacity and surface area along with core flow study results.

Laboratory services are available to perform the testing and analyses needed to develop an optimized treatment design.

For more information about how Cla-Web™ service can help make your unconventional formations more productive, contact your local Halliburton representative or email stimulation@halliburton.com.