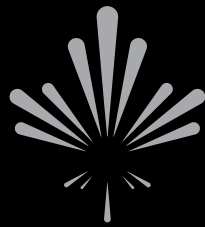


EnerSEAL

MMH TECHNOLOGY
NEXT GENERATION



AES DRILLING FLUIDS



Product Description

EnerSEAL represents the next step in the evolution of high performance water base muds. EnerSEAL is based on proprietary next generation Mixed Metal Hydroxide (MMH) technology that is more stable than previous generations. The unique chemistry and nanoparticle technology of EnerSEAL gives it nearly perfect flow properties for a drilling fluid. This benefits the fluid in a variety of ways: superior cuttings suspension, low surge & pump pressures, a unique ability for the fluid itself to drastically reduce losses to the wellbore, more in-gauge holes, reduced torque and drag, and increased solids control efficiency. EnerSEAL has also been enhanced with a 3 step inhibition package for maximum wellbore and cuttings stability.

Customer Feedback

"It (EnerSEAL) is much more stable than the MMH system from years past."

"We've reduced exposure to dangerous chemicals, and improved waste management with this system."

"Our casing runs have been much smoother, and torque has dropped allowing us to drill faster."



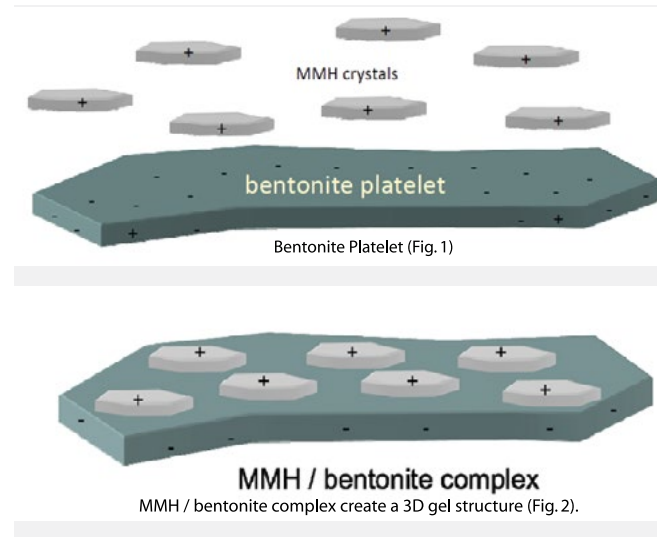
AES DRILLING FLUIDS

EnerSEAL Primary Applications

- Directional & Horizontal Drilling
- Loss Circulation
- Weak & Unconsolidated Formations (e.g. Sandstones)
- Environmentally Conscious Areas
- Coiled Tubing & Wellbore Cleanouts

EnerSEAL Chemistry, Mixed Metal Hydroxide

MMH crystals attach to bentonite platelets by ionic exchange in which the naturally occurring cations on bentonite are exchanged with MMH. This forms a strong association on the face of the clay platelets. (see Fig. 1 and 2)



System Benefits

Next-Generation System Stability

- Minimal reactivity with anionic compounds
- Temperature stable up to 300°F

Formation Stability

- Lost circulation prevented and cured
- Easy flow of fluid into loss zones, followed by a thickening effect to seal formation
- Reduced washout and gauged holes demonstrated by caliper logs.
3 step inhibition includes:
 - ES-K & ES-Hib to reduce swelling and dispersion of sensitive formations
 - ES-Control combined with bentonite for low fluid loss
- "Dead Zone" provides an extra stabilizing layer that reduces washout and fluid invasion

Environmental

- Minimized waste management
- Low HGIS ratings on products
- No acid required in dewatering process
- No biocide required
- No chlorides needed
- Less dilution because cuttings are kept intact

Hole Cleaning

- Superior shear-thinning fluid provides excellent characteristics for a drilling fluid
- Extreme hole cleaning with superior low shear rate viscosity (6 rpm, 3 rpm)
- Low pump pressures and ECD's comparable to that of a conventional fluid
- Low cuttings bed height reduces torque & drag, promotes smooth casing run, and prevents pack-off
- Ability to lift large cuttings and cement chunks from rat hole
- Reduced pump rates can still maintain hole cleaning with less washout

Cuttings Suspension

- When pumps are off, instantaneous gel strengths keep cuttings suspended
- Flat gel structure allows for suspension of cuttings while maintaining low surge pressures
- Superior cuttings suspension in a lateral section

Solids Control

- Higher solids control efficiency resulting in reduced low gravity solids.
- Three step inhibition keeps cuttings more intact and easy removal at the surface.

EnerSEAL Components

- **ES-Vis:** A high performance bentonite clay.

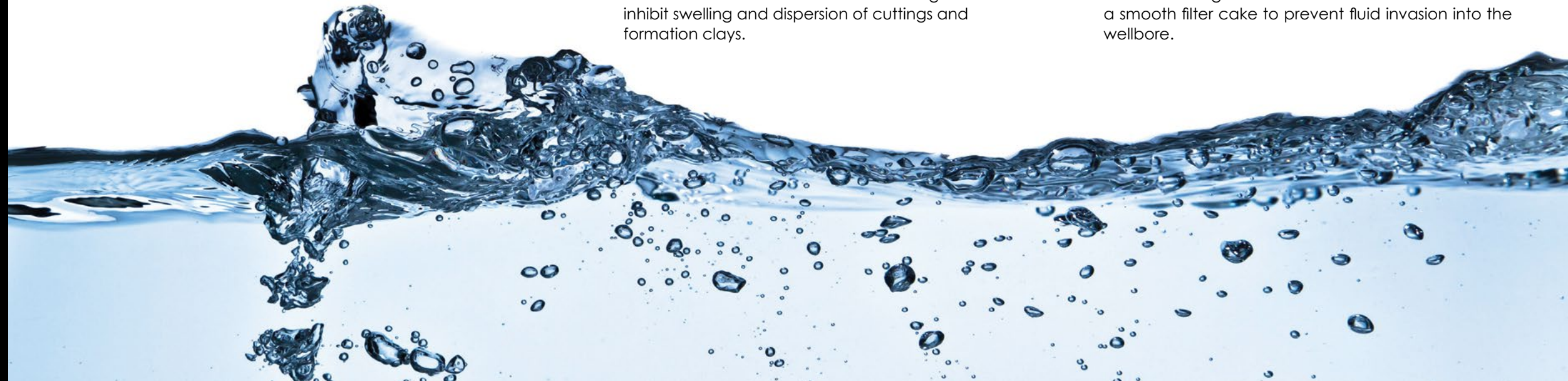
- **ES-RM:** Rheology modifier used to enhance the viscosity provided by the clay. The primary component which provides the unique flow characteristics that makes EnerSEAL such a useful drilling fluid.

- **ES-K:** A water soluble ionic additive designed to inhibit swelling and dispersion of cuttings and formation clays.

- **ES-G:** A water soluble buffer additive that balances ionic displacement from reactive solids.

- **ES-Hib:** An engineered organic additive with higher ionic strength from improved hole inhibition.

- **ES-Control:** A primary fluid loss control agent. ES-Control is designed to work with bentonite to create a smooth filter cake to prevent fluid invasion into the wellbore.



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