



## **Technical Bulletin**

### **Drilling Optimization with EGS DFL**

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EGS Drilling Fluids technology is differential to most drilling fluids technologies on the market today. It has been designed to mitigate several common drilling and completion related challenges that are prevalent during these operations. The benefits of incorporating EGS Drilling Fluids Technologies into an existing program can be substantial in terms of operating efficiencies and bottom line cost savings.

What makes DFL superior than common drilling fluid treatments used today are:

- DFL molecules are non-petroleum based ions with an extremely high affinity towards metal.
- DFL molecules are  $<1\mu\text{m}$  and are therefore able to penetrate mud and chemical buildup on metal surfaces. Once DFL molecules penetrate these surfaces, they bond with loose ferrous molecules as they are covalently drawn into the ferrous metal's micropores. Once bonded, the surface no longer has the cracks, pores, and asperities for the mud/chemical particulate to latch onto and releases them into the lubricant stream to be discharged over the shakers.
- DFL has a high affinity to absorb, bond, and microscopically penetrate ferrous (Iron) surfaces.
- DFL lubricating properties have shown to reduce contact friction by as much as 87%.
- DFL wear protecting properties have shown to reduce wear by as much as 80%.
- Since DFL smooths out the surface for which it has adhered, flowing pressures, such as ECDs are reduced by as much as 65%.
- DFL molecules form metal hydride particles on and below metal surfaces to seal the rough pores and to smooth the metal surface asperities.
- Once DFL coats the surface, DFL prevents corrosion.
- DFL provides protection from abrasion by forming a hardness of nearly 10 (based on the Mohs Hardness Scale), on and below metal surfaces.
- DFL molecules have a 400,000 psi molecular crush strength.
- DFL starts to activate at temperatures above  $-26^{\circ}\text{C}$ . The higher the temperature, the faster the activation time. Testing has shown that DFL shows no signs of degradation up to  $1,000^{\circ}\text{C}$ .

- DFL picks up the existing loose Fe (already in solution from the load zone of the friction environment) as DFL heads toward the broken molecular chains that exist on the surface of the ferrous iron.
- DFL forms a permanent bond, only to be worn off as physics dictates, within the given friction environment.
- DFL is 100% compatible with most drilling fluid systems
- DFL has been tested as Environmentally Safe, meeting all regulatory discharge limits.

DFL has shown to optimize drilling operations in the following areas, through increased drilling efficiencies and thus cost savings as follows:

- Rig Equipment: Reductions in pump pressure, thus allowing an increased flow rate. The increased flow rate can result in higher horsepower per square inch (HSI) at the bit which in-turn results in an increase in ROP.
- ECD Reduction: In low fracture gradient areas or in areas where a higher mud weight is needed to reduce wellbore instability, lower ECDs can reduce the chances of lost fluid returns, enhance hole cleaning by allowing faster flow rates and ultimately help increase ROP. ECDs reductions as high as 65% have been experienced with DFL.
- Torque and Drag Reduction: By reducing contract friction, torque and drag can be reduced by as much as 87%. Furthermore, stick-slip can be substantially reduced which lends itself to smoother drilling, higher ROPs and fewer trips for downhole tool failures including less damage to bit cutters and greater efficiency.
- Wear Reduction: With the protection of the core technology, casing and drill pipe wear can be virtually eliminated, thus reducing equipment and material costs.

Overall there seems to be a potentially large upside to reducing flowing pressure, ECDs and friction. Operational efficiencies could be increased by 20% to 30%, which would translate to substantial overall operational cost savings.

The application of EGS DFL technology has multiple uses and is not intended to merely replace current lubricants that are being used, but to enhance multiple facets of the operation.

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