

POLY-PLUS®

POLY-PLUS polymer is a high-molecular-weight, anionic liquid designed to provide cuttings encapsulation and shale stabilization. POLY-PLUS also acts as a viscosifier, friction reducer and flocculant while providing some fluid-loss control. POLY-PLUS can be used in mud systems ranging from low-solids to weighted, utilizing makeup waters from fresh to saltwater.

TYPICAL PHYSICAL PROPERTIES

Physical appearance	Cream-colored, opaque liquid
Odor	Slightly hydrocarbon
Specific gravity	1.07 – 1.10
pH (1% solution)	8 – 9
Flash point	>200°F (93.3°C) (PMCC)
Pour point	-20°F (-28.9°C)
Viscosity (typical)	~500 cp

Concentration*
lb/bbl (kg/m ³)
0.50 (1.4)
0.75 (2.1)
1.00 (3.0)
1.50 (4.3)

Equivalents
gal/bbl (l/m ³)
0.056 (1.3)
0.084 (2.0)
0.110 (2.6)
0.170 (4.0)

*Based on 30% active material

APPLICATIONS

POLY-PLUS polymer mud systems. POLY-PLUS provides excellent cuttings encapsulation and improved wellbore stability. Typical concentrations of POLY-PLUS are 0.75 to 3 lb/bbl (2.1 to 8.5 kg/m³). It is also effective in salt muds, such as KCl- or NaCl-enhanced fluids, although slightly higher concentrations of POLY-PLUS may be required.

Clear-water fluids. POLY-PLUS may be used in clear-water, solids-free

drilling fluids. POLY-PLUS increases viscosity and enhances solids removal by flocculating the undesired solids. It also provides cuttings encapsulation and improved wellbore stability. This system is frequently used in slimhole continuous-coring applications. The addition of 0.5 to 1.75 lb/bbl (1.4 to 5 kg/m³) enhances solids removal by flocculating solids.



APPLICATIONS

(CONTINUED)

Typical Properties of POLY-PLUS in Freshwater			
Concentration (lb/bbl [kg/m ³])	PV (cp)	YP (lb/100 ft ²)	Marsh Funnel (sec/qt)
0.50 (1.4)	2	2	35
0.75 (2.1)	3	3	37
1.00 (2.9)	4	4	39
1.50 (4.3)	8	8	43

Low-Solids, Non-Dispersed (LSND) muds. POLY-PLUS is well suited to LSND systems. In reduced-bentonite muds, POLY-PLUS serves as a bentonite extender to increase viscosity, flocculates drill solids for more efficient removal, encapsulates cuttings and improves wellbore stability.

Weighted muds. POLY-PLUS can be used in weighted muds for cuttings encapsulation, improved wellbore

stability, secondary viscosity and to improve filter cake integrity. The effectiveness of the polymer is reduced as the concentration of organic, anionic dispersants increases.

POLY-PLUS sweeps. Viscous POLY-PLUS sweeps are effective for periodic hole cleaning. Circulating such a sweep through the well helps clear accumulated cuttings and maintain a clean hole.

METHOD OF ADDITION

POLY-PLUS may be mixed directly into the active mud system or premixed at higher concentrations in a separate pit or chemical barrel, then blended into the active system. It can be poured directly into the pits at any point where good agitation exists such as over a mixer, or added through the mixing hopper or chemical barrel. A small, steady stream of POLY-PLUS injected into

the flowline will provide selective flocculation of drill solids. Caustic and lime should *not* be mixed at the same time as POLY-PLUS.

Sweeps may be accomplished by mixing POLY-PLUS directly in the active system at the suction pit or by pouring 3 to 4 qt (2.8 to 3.8 L) directly into the drillstring during connections.

CONTAMINATION

POLY-PLUS reacts with multivalent cations such as calcium. In concentrations greater than 300 mg/L, calcium causes the polymer to precipitate. Use soda ash to remove calcium concentrations above 300 mg/L.

Treat cement contamination to keep the calcium and pH as low as possible. Use sodium bicarbonate

along with a pH-reducing product such as lignite to treat cement contamination.

Zinc oxide is recommended if hydrogen sulfide gas is encountered. Zinc oxide is preferred to liquid products containing zinc. Due to lower solubility, zinc oxide does not react with POLY-PLUS as readily as liquid products that contain zinc.



ADVANTAGES

- Provides excellent cuttings encapsulation and limits cuttings dispersion.
- Provides improved shale stabilization.
- Enhances the removal of drill solids.
- Aids in preventing balling on the bit, stabilizers and bottom-hole assembly by coating and lubricating solids.
- Liquid product for easy mixing and rapid yield.
- Improves the lubricity of most mud systems, particularly non-dispersed muds, when used in combination with a lubricant.
- Low pour point of -20°F (-28.9°C) for easy use in cold climates.
- Can be used to viscosify clear-water and low-solids drilling fluids.

LIMITATIONS

The following limitations apply to all acrylamide/acrylate copolymers:

- During initial treatment with POLY-PLUS in a non-dispersed mud system, severe flocculation may occur, causing high viscosity until all of the solids are coated. POLY-PLUS polymer mud systems utilize low concentrations (<15 lb/bbl or <43 kg/m³) of M-I GEL® to reduce this interaction. Continued additions of POLY-PLUS result in a stable system with the desired rheology.
- POLY-PLUS is calcium-sensitive and begins to precipitate when the calcium concentration exceeds 300 mg/L.
- POLY-PLUS is pH-sensitive, with an optimum range of 8.5 to 10.5. At pH levels above this range, hydrolysis may convert polyacrylamide into polyacrylate and release ammonia (NH₃).
- POLY-PLUS is temperature-stable to approximately 350°F (176.7°C) although the copolymer may begin to hydrolyze into polyacrylate when exposed to prolonged temperatures above 275°F (135°C) and release ammonia (NH₃).
- POLY-PLUS is subject to shear degradation of its viscosity and may eventually lose the ability to viscosify, but cuttings encapsulation and shale stabilization will not be affected.



TOXICITY AND HANDLING

Bioassay information is available upon request. POLY-PLUS contains mineral oil and may not be acceptable for certain applications.

Handle as an industrial chemical, wearing protective equipment and observing the precautions as described on the Transportation and Material Safety Data Sheet (MSDS).

Small spills should be wiped up with disposable towels or cleaned up with an absorbent material such as sawdust or rig sweep. Undiluted POLY-PLUS should not be washed down with water.

PACKAGING AND STORAGE

POLY-PLUS is packaged in 5-gal (18.9-L), plastic cans.

Keep containers sealed and do not allow water to contaminate

POLY-PLUS containers. Store in a well-ventilated area away from sources of heat or ignition.

This information is supplied solely for informational purposes and M-I LLC makes no guarantees or warranties, either expressed or implied, with respect to the accuracy and use of this data. All product warranties and guarantees shall be governed by the Standard Terms of Sale.



A Smith/Schlumberger Company

P.O. Box 721110
Houston, Texas 77272-1110
Tel: 281-561-1300
Fax: 281-561-7240
www.midf.com
E-mail: mimud@midf.com