



Drilling Fluids, Inc.

PRODUCT BULLETIN - PolyBloc

INTRODUCTION

GEO Drilling Fluids, Inc. offers a unique solution to severe lost circulation. As an alternative to multiple LCM pills or cement plugs, we can provide a product called **PolyBloc**. This material has several advantages over the alternatives.

1. **PolyBloc** works by forming a massive plug of extremely high viscosity material which plugs voids which are too large to be plugged by traditional lost circulation materials.
2. **PolyBloc** has a neutral pH. Placing and drilling out a **PolyBloc** plug does not adversely effect the drilling mud.
3. The cost of a standard **PolyBloc** pill is substantially less than a cement plug.
4. GEO Drilling Fluids, Inc. has portable mixing units which can be sited in the field in standby applications.

The development of the cross-linked polymer product that GEO Drilling Fluids, Inc. calls **PolyBloc**, followed the use of a similar product produced by the former "Petroleum Associates of Lafayette" (PAL). PAL-Mix 110-R was similar to Halliburton's Tembloc series of products which are used to form a polymer plug.

Initially, GEO Drilling Fluids personnel used two 30 barrel slugs of the old 110-R product to cure severe lost circulation on an Arco Oil & Gas well in the Wheeler Ridge area.

The success of the product was such that it seemed very applicable to other areas where lost circulation was a significant problem. The challenge, since the PAL Mix product is no longer available, was to design a competitive product that could be implemented at the well site without the use of extraordinary mixing or pumping equipment. If the product could be mixed by the rig crews and put in place with the rig pumps, then the product could be very advantageous in areas such as the Midway Sunset Field.

The final product was designed after 3 months of intensive testing. The product blend is very

precise in order to achieve an optimum final product. The trailer mounted mixing system was constructed after the product was used on an 11 well program for Arco at Midway Sunset on the Kendon Lease. While the trailer mounted unit provides mixing facilities which work very well for **PolyBloc**, a good pill pit will also work. Additionally, if a pill pit is used, it is possible to weight the pill so that it is balanced to the existing mud weight. Due to the viscosity of the finished product when it is being pumped, migration is not usually a problem.

Typically, **PolyBloc** is used to combat lost circulation in the following manor:

- 1) After lost circulation has occurred, drill as much hole as the rig mud pit volume, and prudence will allow.
- 2) Pull the bit to a safe spot (typically to the shoe).
- 3) A planning meeting is held before mixing to insure that everything is done smoothly and all personnel understand the process.
- 4) Prepare a pill of ten to thirty (10-30) barrels using 32 pounds per barrel **PolyBloc**. Cold (not hot) fresh water is used with enough extender for 1 hour total mixing time plus pumping time. The actual mixing time for the polymer is approximately 10 minutes.
- 5) The bit is run to bottom. Jets need not be removed.
- 6) The **PolyBloc** pill is pulled from the GEO Drilling Fluids, Inc. mixing trailer by the drilling rig's circulating pump and is completely displaced from the drill pipe and collars with water or drilling mud.
- 7) The bit is pulled back up to a safe place while a new pit of mud is mixed. If this is not required, a waiting period of at least 1 hour should be observed to allow the pill to "set up".
- 8) After a sufficient waiting period, and when the sample of the **PolyBloc** which was caught after mixing has set up, the bit is run back to the calculated top of the Poly-Bloc plug. Using a slow pump speed and slow rotation, drill out the **PolyBloc**.

PolyBloc is a precise mixture of synthetic and organic polymers blended with auxiliary chemicals. **PolyBloc** is packaged in 50# water proof bags. **PolyBloc**, when mixed in fresh or brine water will form a time-controlled, cross linking plug. **PolyBloc** plugs are semi-rigid gelatinous materials that form a barrier to flow.

PolyBloc plugs and sweeps are particularly effective for sealing lost circulation zones whenever they occur. In extraordinary cases, **PolyBloc** may be combined with other conventional lost circulation materials.

PolyBloc may be used to stop lost circulation in underground blowouts, to stabilize unconsolidated gravel zones, to minimize differential sticking by sealing off high permeability sands, to seal off tubing or casing, to act as a bottom plug to divert cement and even to cure lost circulation around conductor pipe.

A typical **PolyBloc** plug would consist of about 30 to 35 pounds per barrel of **PolyBloc** in 10 to

30 barrels of water. The **PolyBloc** mixture initially is just a slightly viscous liquid. At a predetermined time, the mixture begins to evolve into a semi-rigid gelatin. The **PolyBloc** mixture is unique in that the setting time can be controlled. Therefore, the pill can be pumped in the hole as a low viscosity liquid. This is extremely advantageous for sealing off loss zones since the **PolyBloc** mixture will flow into the loss zone before setting up.

PolyBloc mixed in water can be pumped wherever mud or water normally would be pumped such as through bit jets, casing cutters, under-reamers, downhole motor, etc.

PolyBloc mixed with regular drilling mud should be avoided, if possible, because of potential contaminants affecting the plug unless there is opportunity for pilot testing. However, with proper pilot testing, virtually any conventional system can be utilized.

PolyBloc is utilized in conjunction with Extender-B which is a "Time of set retarder" for **PolyBloc**. Incremental additions of Extender-B will allow for greater mixing and pumping times.

PolyBloc is specifically designed to be mixed and placed at the well site with ordinary rig mixing and pumping equipment. The only special rig requirement would be for an isolated appropriate sized "pill or slug" pit. In situations where such equipment does not exist, GEO Drilling Fluids has designed portable 30 barrel mixing tanks which can be directly tied into the drilling rig's pumping equipment.

PolyBloc can also be mixed with a time released enzyme breaker. The enzyme breakers will cause the plug to degrade back to dirty water in a specified period. Enzyme degradation is also further enhanced by increased temperatures. **PolyBloc** is virtually 100% acid soluble in 15% HCl.

PolyBloc has a practical temperature limitation of 200▼(F). Temperature at or above 200▼(F), will rapidly degrade the polymer without any enzyme treatment.

MIXING INSTRUCTIONS

It is always good practice to run a bench scale pilot test with the actual mix water before use at the well site.

The following procedures should be followed:

- 1) Fill mixing tank.
- 2) Adjust the pH of the mix water between 9.5 to 10.5 with Caustic Soda.
- 3) Add the prescribed amount of Extender-B.
- 4) Add **PolyBloc** at a minimum concentration of 30 pounds per barrel up to a maximum concentration of 40 pounds per barrel.
- 5) Pump into well bore with a slight over-displacement. **POLY-BLOC** can be displaced with either mud or water. Retain a sample.
- 6) Observe surface sample in order to confirm proper plug consistency downhole.

Caution:

- 1) If the pH of the mix water is greater than 12, the consistency of the plug will be reduced and the setting time will be severely increased.
- 2) Add measured amounts of **PolyBloc** and EXTENDER-B as precisely as possible. Over-treatment with **PolyBloc** will yield a markedly tougher plug, but the plug will also set up much more quickly. Under-treatment with **PolyBloc** will cause the plug to be softer with an increased setting time. Over-treatment or under-treatment with Extender-B will affect setting time accordingly. A full level viscosity cup of **PolyBloc** weighs 2.0 pounds. A full viscosity cup of Extender-B weighs 2.5 pounds.

PRICE LIST (05/01/03)

☞	PolyBloc Polymer	50# bag	\$123.38
☞	Extender B	100# bag	\$371.71
☞	Caustic Soda	50# bag	\$46.45

CASE HISTORIES

CASE #1: ARCO OIL & GAS
Sec. 35, T32S, R23E
Kendon Lease
Midway Sunset Field/Kern County, CA.

In 1993, Arco Oil & Gas drilled 11 wells on the Kendon Lease, all in reasonable proximity to each other. The Kendon Lease is located west of Taft, California off of 25 Hill Road. This area is notorious for severe lost circulation problems.

The first well drilled in the 1993 program lost circulation at 1038'. Conventional methods to regain circulation were utilized. This included 3 lost circulation pills with Sawdust, Cottonseed Hulls, Kwikseal and two cement lost circulation plugs placed by B. J. Hughes. Circulation was finally regained and drilling progressed to 1280' where total loss occurred again. Two conventional lost circulation pills were spotted as before without success. The well was then drilled "blind" to a total depth of 1500'.

The second well encountered lost circulation at 1077'. A 15 barrel **PolyBloc** pill was spotted and drilling resumed with almost 100% returns. As in the previous well, a second loss zone was encountered at 1328'. A 30 barrel **PolyBloc** pill was spotted and drilling proceeded to 1501' TD with full returns.

Thereafter, the remaining nine wells were drilled and when lost circulation was encountered **PolyBloc** pills were utilized. The results are as follows:

Well No.	Lost Circulation	Used PolyBloc	Successful
3	At 828' & 1070'	Yes	Yes
4	None	No	N/A
5	At 1107' and 1360'	Yes	Yes
6	At 1020'	Yes	No
7	At 1068' and 1370'	Yes	Yes
8	At 1625' and 1802'	Yes	Yes
9	None	No	N/A
10	None	No	N/A
11	At 650' Partial Loss	Yes	Yes

In summary, for the 11 well program, 7 wells experienced complete loss of circulation in two different zones. Conventional methods including cementing were used in one well without success. **PolyBloc** was used in the 6 other wells regaining circulation in each instance. One well experienced partial lost circulation which was regained with **PolyBloc**. Three wells did not experience any losses.

PolyBloc was used in 12 instances and was successful in 11 instances.

CASE#2: MOBIL OIL EXPLORATION & PRODUCING
Kern County, California

1) Lost Hills #541 - Spud on 3/2/94

Lost circulation at 1768' with 10.6 ppg mud weight. Pumped 175 bbls LCM pills with no returns. Bridge at 877'. Spotted 2, 30 bbl **PolyBloc** pills at 915' with 70 to 80% returns. Set cement plugs. Redrilled. Lost circulation again at 1777'. Continued with light weight fluid, 9.6 ppg to total depth.

2) Belridge II #4054A-2 - Spud on 3/2/94

Lost circulation at 580'. Pumped 40 bbls LCM pill with no returns. Losses appeared to be around the conductor pipe. Spotted 15 bbls **PolyBloc** at 120' with 100% returns.

3) Belridge I #3057-2 - Spud on 4/8/94

Lost circulation at 900'. Pumped 50 bbls LCM and drilled to 931' with no returns. Spotted 30 bbls **PolyBloc** with 100% returns.

4) Finley Hausen II #629 - Spud on 5/5/94

Lost circulation at 1208'. Pumped 100 bbls LCM mud and drilled to 1289' with intermittent returns. Lost complete returns at 1289'. Spotted 30 bbls **PolyBloc** pill with 100% returns.

5) Moco 35 MC #590 - Spud on 5/9/94

Lost circulation at 1200'. Pumped two 50 bbl LCM pills to fill the hole with no circulation. Drilled blind to 1254'. Spotted first 30 bbls **PolyBloc** pill with 0% returns. Spotted second 30 bbls **PolyBloc** pill with 100% returns. Circulated out **PolyBloc** to 1200' and lost circulation. Spotted first cement plug and plug failed. Spotted second cement plug and dressed off from 1165' to 1190' with full returns. Logged and completed well at 1190'.

6) Moco 35 MB #555 - Spud on 5/16/94

Lost circulation at 738'. Mixed LCM pill and regained circulation. Drilled to 976' and lost complete returns. Spotted 30 bbls **PolyBloc** pill with 10 ppb Walnut Hulls. Regained 100% returns.

TURNING CEMENT WHEN RUNNING SCAB LINERS

- 7) Moco 35 MBC #266A - Spud on 3/20/94
30 bbls **PolyBloc**
- 8) Belridge II #3484B-3 - Spud on 3/24/94
15 bbls **PolyBloc**
- 9) Belridge IV #3116A-3 - Spud on 3/30/94
15 bbls **PolyBloc**
- 10) Belridge IV #3088A-2 - Spud on 4/3/94
15 bbls **PolyBloc**

Many applications of **PolyBloc** have been used in the intervening years. Lost circulation has been cured on wells all over the west side of the San Joaquin Valley as well as occasional use elsewhere in California.