

# Product Catalog



# Symbol explanation



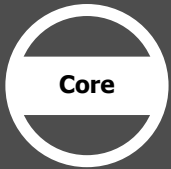
**Horizontal Directional Drilling**



**Micro Tunneling**



**Water well, Geothermal & Geotechnical**



**Core Drilling / Mineral Exploration**



# Content

<b>Introduction</b>	<b>4</b>	<b>Suspension Enhancers</b>	<b>33</b>
<b>Bentonite based fluid properties</b>	<b>5</b>	BARAZAN® D NO-SAG®	
<b>Bentonite</b>	<b>9</b>	<b>Detergents</b>	<b>37</b>
TUNNEL-GEL® PLUS TUNNEL-GEL® MAX TUNNEL-GEL® SW IDP™-696		PENETROL® CONDET® E	
<b>PAC Polymers</b>	<b>15</b>	<b>Grouts</b>	<b>41</b>
PAC™-R PAC™-L QUIK-TROL® QUIK-TROL® LV QUIK-TROL® GOLD QUIK-TROL® GOLD LV		BAROID® DRILL-GROUT BAROID® DRILL-GROUT PLUS	
<b>PHPA Polymers</b>	<b>23</b>	<b>Specialty Products</b>	<b>45</b>
EZ-MUD® EZ-MUD® DP EZ-MUD® GOLD EZ-MUD® PLUS		AQF-2™ IDP™-605 AQUA-CLEAR® PFD CORE-LUBE™ IDP™-699 SODA ASH BARAD-658™	
<b>Lost Circulation Materials</b>	<b>29</b>		
N-SEAL™ DIAMOND SEAL® FUSE-IT®			



# Baroid Industrial Drilling Products

Baroid IDP sales and service engineers average over 30 years experience in several facets of the drilling industry. These individuals bring a comprehensive knowledge of products, drilling methods, regulations and equipment to help customers solve the toughest drilling problems facing your industry. IDP personnel can help in all areas of the drilling project. From product selection through well completion, Baroid IDP representatives are known for being there for the customer.

Baroid developed its reputation by lending expertise at the well site, and can assist the driller in the following areas:

- Solids control system components and configuration
- Circulation pit design
- Products selection and application
- Timely product delivery
- Regional and application-specific know-how

Simply stated, Baroid IDP field sales representatives help customers select the right products, and then help the customer use the products to accomplish the job in the most expedient and cost-effective manner. Regardless of the purpose for drilling the hole, Baroid IDP can provide a field specialist to ensure proper product formulation and application.



# Bentonite based fluid properties





# Fluid properties

## Hardness (Calcium)

Hardness of the make-up water greatly affects the hydration of the bentonite and the added polymers. When the hardness is measured and exceeds 100 ppm, bentonite will be less active and polymers lose some of the properties. For example, the hardness can be measured with indicator strips. Adding soda ash (Sodium Carbonate) to the make-up water, reduces the hardness (Ca) and reaches the desired value of <100 ppm.

## PH

The acidity of the make-up water is indicated in pH. A pH of 7 is called neutral, a pH below 7 is acidic and a pH above 7 is alkaline. For example, the pH can be measured with indicator strips. Generally, the pH of water from ditches and channels end up to be somewhat acidic by influences of e.g. Peat, vegetation, rainwater. By treating make-up with soda ash (Sodium Carbonate), the desired pH of 8.5 / 9.5 can be reached.

## Chlorides (conductivity)

Every bentonite is affected by chlorides, the boundary value for conductivity is approx. <1000  $\mu$ s. If the value is higher than 1000  $\mu$ s, more bentonite will be required than the standard mixing ratio to achieve similar properties. The chloride content of water is difficult and expensive to lower. It is recommended to use suitable water or specialized polymers.

## Specific gravity (density)

Drilling fluid has a certain weight per unit volume (s.g. / specific gravity). The density is measured with a Mud Balance and is expressed in grams/ml or kg/liter. In general the density of a drilling fluid is kept low (<1.05), but if drilled through an artesian flow, it may be necessary to increase the density of the drilling fluid.

## Viscosity

The viscosity is the resistance to flow, also called the "thickness" of a fluid. Viscosity is measured on-site with a Marsh Funnel (measure the number of seconds that expire when 1 liter of drilling fluid flows out) and in the laboratory with a Viscometer. The use of the Viscometer has the advantage that not only Viscosity (Apparent Viscosity = Visible Viscosity) can be measured, but also Plastic Viscosity and Yield Point (carrying capacity).

During drilling, it is not always possible to increase the flow rate (pump volume) to transport more drilled solids. A high pumping speed can result in borehole erosion (washing out), resulting in a larger borehole than intended.

In HDD, the viscosity is both friend and enemy. High viscosity / carrying capacity ensures that the drilled solids are transported out of the borehole, but also causes high pressure to occur at the face of the bit. This can (especially when approaching the exit point) lead to frac-outs.



# Fluid properties

## Filtration control and Filter cake

A very important feature of a bentonite based drilling fluid is filtration control. During drilling, a thin filter cake is deposited on the borehole wall. Together with the overpressure in the borehole due to the density, the filter cake provides a stable borehole.

When drilling through clay layers, the filter cake ensures that minimum fluid penetrates the formation, preventing unwanted swelling or dissolving of clay.

A proper filter cake is thin and smooth. Not only does the filter cake provide borehole stabilization but it also has a lubricating effect during the pulling of the product pipe. Measuring the filtrate loss is done with a Filter-Press. The drilling fluid is pressed through a filter paper for 30 minutes at 100 PSI (7 bar). The amount of water passing the filter cake and filter paper indicates the amount of filtrate loss into the formation.

## Sand

The sand content is measured with a Sand Content Kit. With this test, only a grain size above 75 microns (0.075 mm) is measured. The Sand Content Kit allows you to determine the effectiveness of a recycling installation. A well-functioning recycling system leaves no more than 2% of sand in the drilling fluid.

## Gel strength

Gel strength determines suspension of drilled solids while the fluid is static. If the pump is shut down for a short or long(er) period of time, we want to prevent any drilled solids from settling down inside the drilling fluid. This Gel strength can also be determined with the Viscometer or with a shearometer.

In HDD applications, if the Gel strengths are too low, drilled solids can settle down to the bottom of the borehole where they are difficult to remove. Only in case of a new reaming step, these solids can be removed again. The Gel strengths are measured after 10 seconds and 10 minutes. The Gel strengths are ideal if the 10 seconds Gel and the 10 minute Gel are close to each other.

Gel strength needs to build quickly to prevent drilled solids from settling out of the drilling fluid but should not keep increasing over time. The problem which can occur than is when circulation is being resumed after a long period of stand still, a burst of pressure is created at the drill bit to break the gel structure, this increases the risk of frac-outs.

In (most) vertical applications we are not looking for the same gel strengths as in HDD. We want our drilled solids to be transported out of the borehole by a combination of enough carrying capacity and enough annular flow, but in our settling tanks, the drilled solids should settle out while the drilling fluid is moving at a much slower rate.





# Bentonite





# TUNNEL-GEL<sup>®</sup> PLUS

TUNNEL-GEL<sup>®</sup> PLUS viscosifier is a specially formulated, high-yield bentonite designed for use in tunneling and large diameter HDD operations. TUNNEL-GEL<sup>®</sup> PLUS viscosifier promotes rapid viscosity development while maintaining effective borehole stabilization and enhanced filtration control in most water-based drilling fluids.

## Functions

- Enhanced viscosity development in freshwater drilling fluids
- Effective cuttings transport and suspension characteristics
- Enhanced filtration control and resulting borehole stability
- Effective lubrication fluid for microtunneling operations

## Advantages

- Easy to mix and quickly reaches maximum viscosity
- Enhances fluid lubricity for reduction of required jacking forces
- Yields more than twice as much drilling fluid of the same viscosity as an equal concentration of API grade bentonite

### Approximate amounts of TUNNEL-GEL<sup>®</sup> PLUS viscosifier added to water based fluids

lbs/bbl	lbs/100 gallons	kg/m <sup>3</sup>
8,4 — 12,6	20 — 30	25 — 35





# TUNNEL-GEL<sup>®</sup> MAX

TUNNEL-GEL<sup>®</sup> MAX is a specially formulated, high-yield bentonite designed for use in tunneling and large diameter HDD operations. TUNNEL-GEL<sup>®</sup> MAX promotes rapid viscosity development while maintaining effective borehole stabilization and enhanced filtration control in most water-based drilling fluids.

## Functions

- Viscosifies water-based drilling fluids
- Reduces filtration by forming a thin filter cake with low permeability, resulting in borehole stabilization
- Improves hole-cleaning capability of drilling fluids

## Advantages

- Can provide lubricity
- Can mix easily and quickly reaches maximum viscosity
- Can be effectively used in a wide range of concentrations
- Can be effective in a variety of drilling applications
- Provides the option of using a variety of additives

Approximate amounts of TUNNEL-GEL <sup>®</sup> MAX viscosifier added to water based fluids	
Normal drilling conditions	30 — 40 kg/m <sup>3</sup>
Unconsolidated formations	40 — 45 kg/m <sup>3</sup>





# TUNNEL-GEL<sup>®</sup> SW

TUNNEL-GEL<sup>™</sup> SW viscosifier is a specially formulated bentonite-based drilling fluid additive designed to viscosify brackish or saline make-up water. Fluid systems designed with TUNNEL-GEL<sup>™</sup> SW viscosifier assist in providing borehole stability, filtration control and improved carrying capacity in Drilled Shafts, Tunneling, Horizontal Directional Drilling and other construction applications.

## Functions

- Effective viscosifier in brackish to highly saline make-up water
- Improved carrying capacity
- Enhanced filtration control and borehole stability
- Enhanced borehole stability

## Advantages

- Allows for the use of saline water for fluid development
- Provides lubricity in resulting drilling fluid
- Promotes enhanced fluid stability in saline environments

### Approximate amounts of TUNNEL-GEL<sup>™</sup> SW viscosifier added to saline or freshwater based fluids

lbs/bbl	lbs/100 Gallon	kg/m <sup>3</sup>
8,4 — 12,6	20 — 30	25 — 35





# IDP™-696

IDP™-696 viscosifier, is an easy-to-mix, finely ground (200 mesh), specially selected sodium activated bentonite for the vertical drilling industry. IDP™-696 viscosifier imparts viscosity, fluid loss control, and gelling characteristics to freshwater-based drilling fluids.

## Functions

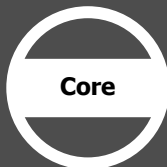
- Mix with fresh water to form a low-solids drilling fluid for general drilling applications
- Viscosify water-based drilling fluids
- Reduce filtration by forming a thin filter cake with low permeability
- Improve hole-cleaning capability of drilling fluids

## Advantages

- Single sack product and cost-effective
- Can provide lubricity for drilling fluids
- Can mix easily and quickly reaches maximum viscosity
- Can yield more than twice as much drilling fluid of the same viscosity

### Approximate amounts of IDP™-696 viscosifier added to freshwater based fluids

Normal drilling conditions	20 — 30 kg/m <sup>3</sup>
Unconsolidated formations	30 — 40 kg/m <sup>3</sup>





# PAC Polymers





# PAC™-R

PAC™-R modified natural cellulosic polymer provides filtration control in most water-based drilling fluids. PAC™-R additive, when added to a IDP-696 slurry, yields a drilling mud system suitable for drilling in sandy formation. PAC™-R additive can be added to vegetable or mineral oil to provide an oil-based fluid suspension, which can be poured into drill string directly. PAC™-R additive is also used in air/gel-foam drilling.

## Functions

- Can provide filtration control in fresh or brackish water-based drilling fluids
- Can promote borehole stability in water sensitive formations
- Can minimize rotational torque and circulating pressure
- Can improve hole cleaning and core recovery
- Can stiffen foam to improve cuttings transport in air/foam drilling
- Can reduce air requirements, uphole velocity and borehole annulus pressure in air/foam drilling

## Advantages

- Effective in fresh water, salt water and brackish water-based drilling fluids
- Effective in small quantities for filtration control
- Non-fermenting
- Compatible with other Baroid drilling fluid additives
- Resistant to harsh environments and contaminants

### Approximate amounts of PAC™-R polymer added to water-based fluids

Fresh or salt water	4 — 7 kg/m <sup>3</sup>
Added to bentonite slurry	0.5 — 2 kg/m <sup>3</sup>







# PAC™-L

PAC™-L modified natural cellulosic polymer provides filtration control in most water-based drilling fluids without substantially increasing viscosity. PAC™-L polymer when added to a bentonite slurry, yields a drilling mud system suitable for drilling in sandy formation. PAC™-L polymer can be added to vegetable or mineral oil to provide an oil-based fluid suspension, which can be poured into drill string directly.

## Functions

- Can provide filtration control in fresh or brackish water-based drilling fluids
- Can reduce fluid loss without significantly increasing fluid viscosity
- Can encapsulate shale to prevent swelling and disintegration
- Can promote borehole stability in water sensitive formations
- Can minimize rod chatter, rotational torque and circulating pressure
- Can improve hole cleaning and core recovery

## Advantages

- Effective in fresh water, salt water and brackish water-based drilling fluids
- Effective in small quantities for filtration control
- Non-fermenting
- Compatible with other Baroid drilling fluid additives
- Resistant to harsh environments and contaminants

### Approximate amounts of PAC™-L polymer added to water-based fluids

Fresh or salt water	4 — 8 kg/m <sup>3</sup>
Added to bentonite slurry	0.5 — 2.5 kg/m <sup>3</sup>

**HDD**

**Micro**

**Vertical**

**Core**



# QUIK-TROL®

QUIK-TROL®, modified natural cellulosic polymer, provides filtration control in most water-based drilling fluids. QUIK-TROL®, when added to a bentonite slurry, yields a drilling mud system suitable for drilling in sandy formation. QUIK-TROL® can be added to vegetable or mineral oil to provide an oil-based fluid suspension, which can be poured into drill string directly. QUIK-TROL® is also used in air/gel-foam drilling.

## Functions

- Can provide filtration control in fresh or brackish water-based drilling fluids
- Can promote borehole stability in water sensitive formations
- Can minimize rotational torque and circulating pressure
- Can improve hole cleaning and core recovery
- Can stiffen foam to improve cuttings transport in air/foam drilling
- Can reduce air requirements, uphole velocity and borehole annulus pressure in air/foam drilling

## Advantages

- NSF/ANSI Standard 60 certified
- Effective in fresh water, salt water and brackish water-based drilling fluids
- Effective in small quantities for filtration control
- Non-fermenting
- Compatible with other Baroid drilling fluid additives
- Resistant to harsh environments and contaminants

### Approximate amounts of QUIK-TROL® polymer added to water-based fluids

Fresh or salt water	4 — 7 kg/m <sup>3</sup>
Added to bentonite slurry	0.5 — 2 kg/m <sup>3</sup>





# QUIK-TROL® LV

QUIK-TROL® LV modified natural cellulosic polymer provides filtration control in most water-based drilling fluids without substantially increasing viscosity. QUIK-TROL® LV modified natural cellulosic polymer when added to a bentonite slurry, yields a drilling mud system suitable for drilling in sandy formation. QUIK-TROL® LV polymer can be added to vegetable or mineral oil to provide an oil-based fluid suspension, which can be poured into drill string directly.

## Functions

- Can provide filtration control in fresh or brackish water-based drilling fluids
- Can reduce fluid loss without significantly increasing fluid viscosity
- Can encapsulate shale to prevent swelling and disintegration
- Can promote borehole stability in water sensitive formations
- Can minimize rod chatter, rotational torque and circulating pressure
- Can improve hole cleaning and core recovery

## Advantages

- NSF/ANSI Standard 60 certified
- Effective in fresh water, salt water and brackish water-based drilling fluids
- Effective in small quantities for filtration control
- Non-fermenting
- Compatible with other Baroid drilling fluid additives
- Resistant to harsh environments and contaminants

### Approximate amounts of QUIK-TROL® LV polymer added to water-based fluids

Fresh or salt water	4 — 8 kg/m <sup>3</sup>
Added to bentonite slurry	0.5 — 2.5 kg/m <sup>3</sup>

**HDD**

**Micro**

**Vertical**

**Core**



# QUIK-TROL<sup>®</sup> GOLD

QUIK-TROL<sup>®</sup> GOLD, highly dispersable, polyanionic cellulosic (PAC) polymer, provides ease of mixing and improved filtration control in most water-based drilling fluids. QUIK-TROL<sup>®</sup> GOLD, highly dispersable polymer, when added to a bentonite slurry, yields a low filtrate drilling fluid system suitable for drilling in water sensitive formations.

## Functions

- Disperses and hydrates effectively at low shear
- Provides filtration control in water-based drilling fluids
- Promotes borehole stability in water sensitive formations
- Minimizes rotational torque and circulating pressure
- Improves hole cleaning and core recovery
- Enhances foam properties to improve cuttings transport in air/foam drilling

## Advantages

- Effective in fresh, salt and brackish water-based drilling fluids
- Non-fermenting
- NSF/ANSI Standard 60 certified
- Compatible with other Baroid drilling fluid additives

### Approximate amounts of QUIK-TROL<sup>®</sup> GOLD added to water-based fluids

lbs/bbl	lbs/100 gallons	kg/m <sup>3</sup>
0.1 — 2	0.25 — 4.75	0.3 — 5.7

**HDD**

**Micro**

**Vertical**

**Core**



# QUIK-TROL® GOLD LV

QUIK-TROL® GOLD LV highly dispersible, low viscosity polyanionic cellulosic (PAC) polymer provides filtration control in most water-based drilling fluids. QUIK-TROL GOLD® LV low viscosity PAC polymer, when added to a bentonite slurry, yields a low filtrate drilling fluid system suitable for drilling in water sensitive formations.

## Functions

- Filtration control in fresh or brackish water-based drilling fluids
- Borehole stability in water sensitive formations
- Encapsulation of shale to prevent swelling and disintegration
- Minimized rod chatter, rotational torque and circulating pressure
- Improved hole cleaning and core recovery
- Enhanced foam properties to improve cuttings transport in air/foam drilling

## Advantages

- Disperses readily, even with low shear
- Effective in fresh, salt and brackish water-based drilling fluids
- Resistant to harsh environments and contaminants
- Efficiently improves filtration control
- effective at low concentrations
- Non-fermenting
- Compatible with other Baroid drilling fluid additives
- NSF/ANSI Standard 60 certified

**Approximate amounts of QUIK-TROL® GOLD LV filtration control additive added to water-based fluids**

lbs/bbl	lbs/100 gallons	kg/m <sup>3</sup>
0.1 — 2	0.25 — 4.7	0.3 — 5.7

**HDD**

**Micro**

**Vertical**

**Core**



# PHPA Polymers





# EZ-MUD<sup>®</sup>

EZ-MUD<sup>®</sup> liquid polymer emulsion containing partially hydrolyzed polyacrylamide/polyacrylate (PHPA) copolymer, is used primarily as a borehole stabilizer to prevent reactive shale and clay from swelling and sloughing. EZ-MUD<sup>®</sup> polymer emulsion is also added to low-solids drilling fluids to increase lubricity, fluid viscosity, and to improve carrying capacity of air/foam injection fluids.

## Functions

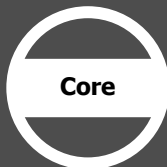
- Can stabilize reactive shale and clay formations
- Can improve borehole stability
- Can enhance slurry rheological properties
- Can alleviate mud rings, bit balling and booting-off in clay formations
- Can reduce drill pipe torque and pumping pressure
- Can minimize rod chatter in diamond core drilling
- Can create "stiff-foam" and maintain foam integrity
- Can flocculate non-reactive solids in reserve pit at low concentrations

## Advantages

- Mixes easily with minimum shear in fresh water
- Helps provide effective clay and shale stabilization with lower viscosity
- Helps impart high degree of lubricity
- Non-fermenting
- Breaks down chemically with bleach (sodium hypochlorite)
- NSF/ANSI Standard 60 Certified

### Approximate amounts of EZ-MUD<sup>®</sup> polymer added to drilling fluid system

Added to fresh water	Added to bentonite fluids	Added to air/foam injection liquid
1 — 5 liters/m <sup>3</sup>	1 — 2.5 liters/m <sup>3</sup>	1 — 2.5 liters/m <sup>3</sup>







# EZ-MUD<sup>®</sup> DP

EZ-MUD<sup>®</sup> DP borehole stabilizing dry synthetic polymer contains high molecular weight partially hydrolyzed polyacrylamide/polyacrylate (PHPA) copolymer. EZ-MUD<sup>®</sup> DP water-soluble polymer, when mixed with fresh water, hydrates quickly and forms a clear, viscous fluid. EZ-MUD<sup>®</sup> DP dry polymer provides excellent borehole stability through a coating mechanism (encapsulation).

## Functions

- Stabilize reactive clay and shale formations
- Keep trench excavation open during the construction
- Produce high viscosity solids-free slurry
- Enhance rheological properties of a low-solids drilling mud
- Enhance core recovery in continuous wireline coring operations
- Flocculate non-reactive solids in reserve pit at low concentrations
- Reduce torque and drag

## Advantages

- Can disperse easily with minimal shear
- Efficient shale/clay stabilizer and viscosifier
- Helps impart high degree of lubricity
- Compatible with other drilling fluid additives when added in proper sequence
- Non-fermenting
- No petroleum distillates involved
- Breaks down chemically with bleach (sodium hypochlorite)
- NSF/ANSI Standard 60 Certified

### Approximate amounts of EZ-MUD<sup>®</sup> DP polymer added to drilling fluid system

Added to fresh water	Added to bentonite fluids	Added to air/foam injection liquid
0.5 — 2.5 kg/m <sup>3</sup>	0.3 — 1 kg/m <sup>3</sup>	0.5 — 1 kg/m <sup>3</sup>

**HDD**

**Micro**

**Vertical**

**Core**



# EZ-MUD<sup>®</sup> GOLD

EZ-MUD<sup>®</sup> GOLD, clay and shale stabilizer, provides inhibition of clay and shale formations in water-based drilling fluids without substantially increasing viscosity. EZ-MUD<sup>®</sup> GOLD, when added to a bentonite slurry, yields an inhibitive drilling fluid system while maintaining manageable and effective fluid properties. The unique beaded structure of EZ-MUD<sup>®</sup> GOLD allows the material to be mixed easily at minimal shear thereby eliminating the need for liquid emulsions.

## Functions

- Enhances rheological properties of a low-solids drilling mud
- Promotes clay and shale stabilization to prevent swelling and/or dispersion
- Promotes borehole stability in water sensitive formations
- Minimizes rotational torque and circulating pressure
- Promotes enhancement of air-foam system capabilities
- Enhances core recovery in continuous wireline coring operations

## Advantages

- NSF/ANSI Standard 60 certified
- Unique physical structure allows for easy dispersion and mixing with minimal shear
- Allows for use of increased concentrations to gain inhibition without excess viscosity
- No petroleum distillates present
- Breaks down chemically with bleach (sodium hypochlorite)
- Compatible with other Baroid drilling fluid additives when added in proper sequence
- Non-fermenting

### Approximate amounts of EZ-MUD<sup>®</sup> GOLD polymer added to drilling fluid system

Added to fresh water	Added to bentonite fluids	Added to air/foam injection liquid
1 — 3 kg/m <sup>3</sup>	0.3 — 1 kg/m <sup>3</sup>	1 — 3 kg/m <sup>3</sup>

**HDD**

**Micro**

**Vertical**

**Core**



# EZ-MUD<sup>®</sup> PLUS

EZ-MUD<sup>®</sup> PLUS liquid polymer emulsion contains partially hydrolyzed polyacrylamide/polyacrylate (PHPA) copolymer and is used primarily as a viscosifier and borehole stabilizer to prevent reactive shales and clays from swelling and sloughing. EZ-MUD<sup>®</sup> PLUS is also added to low-solids drilling fluids to increase lubricity and to improve the carrying capacity of air/foam injection fluids. EZ-MUD<sup>®</sup> PLUS polymer emulsion is a high molecular weight version of EZ-MUD<sup>®</sup> polymer emulsion with improved properties.

## Functions

- Stabilize reactive shale and clay formations
- Improve borehole and excavation stability
- Enhance slurry rheological properties
- Alleviate mud rings, bit balling and booting-off in clay formations
- Reduce drill pipe torque and pumping pressure
- Minimize rod chatter in diamond core drilling
- Create "stiff-foam" and maintain foam integrity
- Flocculate non-reactive solids in reserve pit at low concentrations

## Advantages

- Liquid form – mixes easily with minimum shear in fresh water
- Efficient shale/clay stabilizer and viscosifier
- Non-fermenting
- Cost-effective - small amounts produce desired results
- Breaks down chemically with bleach (sodium hypochlorite)
- NSF/ANSI Standard 60 Certified

### Approximate amounts of EZ-MUD<sup>®</sup> PLUS polymer added to drilling fluid system

Added to fresh water	Added to bentonite fluids	Added to air/foam injection liquid
2.5 — 6.5 liters/m <sup>3</sup>	1 — 2.5 liters/m <sup>3</sup>	1 — 2.5 liters/m <sup>3</sup>

**HDD**

**Micro**

**Vertical**

**Core**



# Lost Circulation Materials





# N-SEAL™

N-SEAL™ acid soluble lost circulation material is specially formulated extrusion spun mineral fiber. Due to its solubility in weak acids, N-SEAL lost circulation material is easily removed from production zones.

## Functions

N-SEAL material can be used as an additive for loss of circulation in concentrations of up to 86 kg/m<sup>3</sup>.

## Advantages

- NSF/ANSI Standard 60 certified
- Acid soluble
- Easily-wetted
- Inorganic and non-fermenting

For normal treatment to the active system, add 6-24 kg/m<sup>3</sup> drilling fluid

As a pill, add 24-86 kg/m<sup>3</sup> of drilling fluid

**HDD**

**Micro**

**Vertical**

**Core**



# DIAMOND SEAL<sup>®</sup>

DIAMOND SEAL<sup>®</sup> is a water-swellable but not water-soluble, 100% crystalline synthetic polymer. DIAMOND SEAL<sup>®</sup> absorbs hundreds of times its own weight in water. It is intended for use primarily as a lost circulation material for horizontal directional drilling.

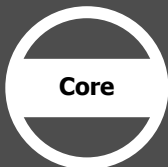
## Functions

- Lost circulation material for horizontal directional drilling
- Prevent inadvertent returns in river crossing applications
- Stabilize borehole in cobble and gravel
- Stabilize unconsolidated formations

## Advantages

- Rapid water absorption
- Effective in mitigating lost circulation
- Economical – small quantity yields large volume
- Easy to use
- Non-fermenting

<b>As a pill</b>	Add DIAMOND SEAL <sup>®</sup> at 12–24 kg/m <sup>3</sup> of drilling fluid
<b>Treatment for loss of circulation</b>	<p>(Prior to pumping remove all in-line screens in circulation system)            Add the following to existing drilling fluid and displace:</p> <p style="text-align: center;">N-SEAL<sup>™</sup> - 3.5–6 kg/m<sup>3</sup>            DIAMOND SEAL<sup>®</sup> - 12–24 kg/m<sup>3</sup></p>





# FUSE-IT®

FUSE-IT® lost circulation material is a fast-acting, synthetic polymer-based lost circulation material designed to help seal off even the most severe loss zones in as little as 30 minutes allowing the operator to return to normal drilling activities.

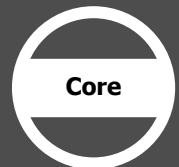
## Functions

- Lost circulation material for vertical and horizontal drilling applications
- Suitable for addressing fractured and vugular formations
- Effective LCM for sand, gravel and cobble environments
- Can stabilize unconsolidated formations

## Advantages

- NSF/ANSI Standard 60 certified
- Rapid reaction upon contact with water
- Enables quick response to loss of circulation
- Easy to use
- Non-fermenting
- Temperature tolerant
- Compatible with other Baroid products

<p><b>As a slug treatment</b></p>	<ul style="list-style-type: none"> <li>• Add 20-40 liters of vegetable oil directly into drillstring to pre-coat metal surfaces of drillstring</li> <li>• Follow immediately into drillstring with 1-2 buckets of FUSE-IT</li> <li>• Follow addition of FUSE-IT lost circulation material with 20-40 liters of vegetable oil and displace. Following displacement allow 30-60 minutes for hydration prior to attempt to regain circulation</li> </ul>
<p><b>As a pill</b></p>	<ul style="list-style-type: none"> <li>• Add FUSE-IT lost circulation material to drilling fluid at a concentration of 0.5-1.0 % by volume (2-4 qts/100 gallons or 5-10 liters/m<sup>3</sup> ) and displace mixture immediately into zone of interest.</li> </ul>





# Suspension Enhancers





# BARAZAN<sup>®</sup> D

BARAZAN<sup>®</sup> D suspension enhancer is a premium quality, powdered biopolymer that is used to enhance the carrying capacity of both clay and polymer-based drilling fluids without significantly increasing the viscosity of the slurry. BARAZAN<sup>®</sup> D is easily dispersible in fresh or brackish water.

## Functions

- Increased gel strength of the drilling fluid for better suspension of the drilled cuttings, coarse sand and gravel
- Enhanced carrying capacity for solids suspension at lower viscosity to further ensure flowability on longer length bores and backreams
- Improved resistance to contamination when drilling in brackish and salt water environments

## Advantages

- Can mix easily into pre-hydrated bentonite-based fluids
- Helps enhance system by increasing the suspension properties of the base drilling fluid with a minimal increase in viscosity

### Approximate amounts of BARAZAN<sup>®</sup> D suspension enhancer added to water-based drilling fluids

Added to bentonite fluids	0.5—2.5 kg/m <sup>3</sup>
Added to pure polymer systems	1—5 kg/m <sup>3</sup>





# NO-SAG<sup>®</sup>

NO-SAG<sup>®</sup> suspension enhancer is a premium quality, powdered biopolymer that is used to enhance the carrying capacity of both clay and polymer-based drilling fluids without significantly increasing the viscosity of the slurry. NO-SAG<sup>®</sup> is easily dispersible in fresh or brackish water.

## Functions

- Increased gel strength of the drilling fluid for better suspension of the drilled cuttings, coarse sand and gravel
- Enhanced carrying capacity for solids suspension at lower viscosity to further ensure flowability on longer length bores and backreams
- Improved resistance to contamination when drilling in brackish and salt water environments

## Advantages

- Can mix easily into pre-hydrated bentonite-based fluids
- Helps enhance system by increasing the suspension properties of the base drilling fluid with a minimal increase in viscosity
- Small packaging for ease of handling and reduction of waste

<b>Approximate amounts of NO-SAG<sup>®</sup> suspension enhancer added to water-based drilling fluids</b>	
Added to bentonite fluids	0.5—2.5 kg/m <sup>3</sup>
Added to pure polymer systems	1—5 kg/m <sup>3</sup>





# Detergents





# PENETROL®

PENETROL® water miscible, non-ionic wetting agent is designed to counteract the sticking tendencies of clay.

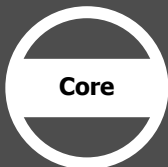
## Functions

- Can reduce or eliminate bit balling
- Can reduce surface tension of drilling fluid, which allows faster chip removal without continuously grinding the hard shale formations
- Can improve drilling efficiency by preferentially coating the bottom-hole assembly and drill string
- Can minimize differential sticking
- Can increase bit life and reduce drill pipe and bottom-hole assembly wear

## Advantages

- Easy to mix
- Effective in low concentrations
- Compatible with other Baroid drilling fluid additives
- Biodegradable

<b>Added uniformly through circulation system</b>	0.5—3 liters/m <sup>3</sup>
<b>Added as a slug down drill rods</b>	1—2 liters/drill rod





# CON DET<sup>®</sup> E

CON DET<sup>®</sup> E wetting agent is a proprietary blend of anionic surfactants is specially formulated for use in fresh water, salt water, and in low-solids drilling fluids.

## Functions

- Keep the drill bit clean
- Slow breakup of cuttings while being transported from bit to surface
- Counteract the sticking tendencies of clays, thereby reducing wall packing, bit balling, booting-off, and formation of mud rings
- Settling of cuttings at the surface in low solids fluid systems

## Advantages

- Effective in low concentrations
- Easy to mix with water
- Biodegradable
- Compatible with other Baroid products

### Approximate amounts of CON DET<sup>®</sup> E wetting agent added to water

To promote bit cleaning and to settle cuttings	2—5 liters/m <sup>3</sup>
To reduce stickiness of clays	5—12 liters/m <sup>3</sup>

**HDD**

**Core**

**Vertical**





# Grouts





# BAROID® DRILL-GROUT

BAROID® DRILL-GROUT sealing material is a self-setting suspension which can be used in HDD and Vertical applications to fill annular spaces or abandon open boreholes after drilling is complete. BAROID® DRILL-GROUT provides flexibility to the user by providing significant working time and gradual development of compressive strength in the resultant slurry.

## Functions

- Filling the annular space surrounding product line installations
- Hardens into a solid set material with low permeability which prevents comingling of aquifers
- Prevention of ground subsidence
- Protection of steel pipes against corrosion

## Advantages

- Easy to mix and pump
- Can be mixed with standard centrifugal pumps
- Effective annular sealing or borehole abandonment material
- Compatible with potable groundwater as assessed by the German Hygiene Institute

Add BAROID® DRILL-GROUT at a concentration of approximately 160-180 kg/m<sup>3</sup> of freshwater. Fine adjustments to the formulation may be made by varying the solids content of the resultant slurry; the recommended Marsh Funnel Viscosity of the slurry is approximately 45 sec/liter prior to use and introduction into the borehole.

**HDD**

**Micro**

**Vertical**

**Core**



# BAROID® DRILL-GROUT PLUS

BAROID® DRILL-GROUT PLUS sealing material is a self-setting suspension which can be used in HDD and Vertical applications to fill annular spaces or abandon open boreholes after drilling is complete. BAROID® DRILL-GROUT PLUS provides flexibility to the user by providing significant working time and gradual development of compressive strength in the resultant slurry.

## Functions

- Filling the annular space surrounding product line installations
- Hardens into a solid set material with low permeability which prevents comingling of aquifers
- Prevention of ground subsidence
- Protection of steel pipes against corrosion

## Advantages

- Easy to mix and pump
- Can be mixed with standard centrifugal pumps
- Effective annular sealing or borehole abandonment material
- Enhanced compressive strength development
- Compatible with potable groundwater as assessed by the German Hygiene Institute

Add BAROID® DRILL-GROUT PLUS at a concentration of approximately 330-350 kg/m<sup>3</sup> of freshwater. Fine adjustments to the formulation may be made by varying the solids content of the resultant slurry; the recommended Marsh Funnel Viscosity of the slurry is approximately 45-55 sec/liter prior to use and introduction into the borehole.

**HDD**

**Micro**

**Vertical**

**Core**



# Specialty Products





# AQF-2™

AQF-2™ foaming agent is an anionic surfactant which can be added to fresh water for air/foam, air/gel-foam, or mist drilling applications.

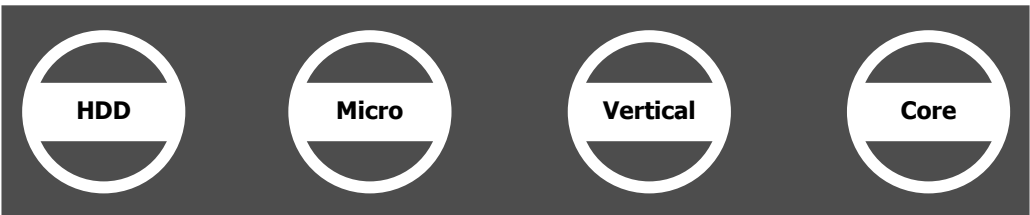
## Functions

- Enhance the efficiency of cuttings removal Increase the ability to lift large volumes of water
- Improve hole-cleaning capability of the airstream
- Reduce the sticking tendencies of wet clays, minimizing the risk of mud rings and wall packing
- Reduce erosion of poorly consolidated formations
- Drilling in zones with lost circulation
- Increase borehole stability
- Reduce air-volume requirement

## Advantages

- NSF/ANSI Standard 60 certified
- Elevated flash point for easier shipping
- High quality, high expansion foam with a consistency similar to shaving foam
- High stability with excellent retention time
- Proven product for multi-discipline application

<b>Approximate amounts of AQF-2™ foaming agent added to injection water</b>		
<b>% by volume</b>	<b>Amount/100 gallon</b>	<b>Liters/m<sup>3</sup></b>
0.5—2	0.5—2	5—20





# IDP™-605

IDP™-605 torque reducer is a specially formulated, aqueous solution designed to help provide friction reduction and improve lubrication characteristics of water-based drilling fluids. IDP™-605 torque reducer can be used in horizontal directional drilling, microtunneling, construction applications and vertical drilling to aid in the reduction of rotational torque, pull back pressures or jacking forces when used as a component of water-based drilling fluids.

## Functions

- Enhanced lubricating properties in most water-based drilling fluids
- Reduced rotational torque and drag on the drill pipe while drilling
- Reduced potential for differential sticking
- Enhanced torque reduction in continuous wireline coring operations
- Increased wellbore stability by producing a compact and slick filter cake

## Advantages

- Easy to mix
- Effective torque reduction in a wide-range of geologic conditions
- Cost effective at moderate to low concentrations
- Compatible with other Baroid drilling fluid additives

### Approximate amounts of IDP™-605 torque reducer added to water-based drilling fluids

% by volume	Quart/100 gallon	Liters/m <sup>3</sup>
0.25—2	1—8	2.5—20

**HDD**

**Micro**

**Vertical**

**Core**



# AQUA-CLEAR® PFD

AQUA-CLEAR® PFD concentrated liquid polymer dispersant provides superior mud and sediment removal from the producing formation and gravel pack. This product is also a highly effective mud thinner. AQUA-CLEAR® PFD dispersant contains no phosphates.

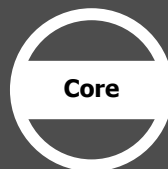
## Functions

- Can disperse mud, sediment and clay from the producing formation and gravel pack in the screened interval.
- Can reduce viscosity and gel strength of drilling fluids

## Advantages

- NSF/ANSI Standard 60 certified
- Helps reduce development time
- Helps increase well yield and capacity
- Safe to use on most plastics, rubber and metals
- Non-fermenting
- Can reduce pumping costs

<p><b>As a well development aid</b></p>	<p>AQUA-CLEAR PFD (gal or L) = 0.002 x Water Volume (gal or L)</p>
<p><b>As a mud thinner</b></p>	<p>Start by adding 0.25 liter of AQUA-CLEAR® PFD to 1m<sup>3</sup> of mud. Increase concentration until desired viscosity is achieved.</p>







# CORE-LUBE™

CORE-LUBE™ natural, linseed-based soft soap is used as a core barrel lubricant on diamond core drills.

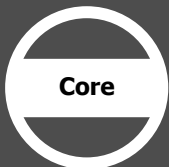
## Functions

- Easy sliding of the core into the inner tube
- Lubrication of the core lifter
- Minimized wear on the inner tube
- Formulation of a non-polluting water-based solution for cleaning inner tube components and rig equipment

## Advantages

- Helps improve core recovery Helps extend length of core run in broken ground
- Can lengthen useable life of downhole wireline components

<p><b>As aid in core recovery</b></p>	<p>A handful or saturated swab of CORE-LUBE lubricant may be smeared inside the bottom of the inner tube before it is inserted into the drill rods. Also, a liberal amount may be applied to the core lifter parts.</p>
<p><b>As a cleaning solution for drill rig components</b></p>	<p>Mix 5 liters of CORE-LUBE lubricant per m<sup>3</sup> of water.</p>





# IDP™-699

IDP™-699 Horizontal Directional Drilling (HDD) fluid concentrate, when mixed with fresh water, provides a clay-free, biodegradable fluid for use in various drilling applications, particularly in situations where clay-based drilling fluids are restricted.

## Functions

- Provide a clay-free drilling fluid
- Minimized formation damage
- Maximized recovery rate of contaminants during remediation
- Enhanced viscosity for hole cleaning
- High yield point and gel strength for effective suspension and transport
- Reduce filtration rate in poorly consolidated formation
- Improve borehole stability for easy well installation

## Advantages

- Soluble in water and disperses easily with moderate shear
- Compatible with wide range of make-up waters
- Does not form filter cake on the wellbore
- Stable and yet biodegradable within a reasonable time frame depending on the surrounding environment
- Preserve with addition of small quantity of 5.25% sodium hypochlorite solution
- Breakdown chemically by calcium hypochlorite

### Approximate amounts of IDP™-699 drilling fluid concentrate added to fresh water

Normal boring conditions	25—30 lb/100 gallon	30—36 kg/m <sup>3</sup>
Unconsolidated formations	30—35 lb/100 gallon	36—42 kg/m <sup>3</sup>

**HDD**

**Micro**

**Vertical**

**Core**



# SODA ASH

Soda Ash alkalinity agent is a granular powder form of sodium carbonate primarily used to condition and soften make-up water and to raise pH.

## Functions

- Treat out calcium hardness in make-up water
- Raise pH

## Advantages

- Can eliminate calcium ions by converting to insoluble carbonate
- Can maximize the performance of bentonite and polymer products

General treatment
1—2.5 kg/m <sup>3</sup> of make-up water.



# BARAD-658™

BARAD-658™ cement additive is designed for cement systems consisting of construction grade Portland cement and water. Based on a 1.87 S.G. slurry design, this additive imparts filtration control with a fast, even dispersion of the cement in water. It is suitable for use in development of annular seals, well abandonment and placement of directional wedges.

## Functions

- Controls filtration rates across permeable zones
- Delivers high compressive strength development within 24 hours
- Suitable for use in fresh or salt water

## Advantages

- Provides an easily pumped slurry with lower viscosity than typical high density cements
- Reduces number of stages, or jobs, required to fully cement the well
- Lower pump demands and gives a more effective placement of the cement column
- May be used in fresh or seawater
- Will remain fluid in mixing equipment longer than typical high density cements
- Filtration control properties will help protect formations and guard against flash setting of cement
- May be either added to mix water before cement or dry-blended into cement prior to hydrations

To obtain the greatest benefit from BARAD-658™ cement additive the material should be added to the make-up water and mixed at high shear prior to the addition of the cement.

The recommended usage concentration of BARAD-658™ cement additive is 0.4 kg per 50 kg of cement, or 0.8% by weight of cement.

Suitable cements for use are ASTM Type I, API Class A, ASTM Type II, API Class B, ASTM Type III or API Class C Portland cement.

**HDD**

**Micro**

**Vertical**

**Core**





## European contacts

Name	E-mail	Phone
Fred Blomsma	fred.blomsma@cebo.com	+31 651 553 286
Marcel Bijleveld	marcel.bijleveld@cebo.com	+31 651 660 092
Jaap Kommer	jaap.kommer@cebo.com	+31 653 162 989
Frank Ooms	frank.ooms@cebo.com	+31 631 745 248
Petyo Toshev	petyo.toshev@cebo.com	+359 882 943 136
Ulrich Schröder	Ulrich.Schroeder@Halliburton.com	+49 1520 1541 121
Ruslan Mekhdikhanov	ruslan.mekhdikhanov@halliburton.com	+7 915 460 3196

### **Cebo Holland B.V.**

Westerduinweg 1  
1976 BV IJMUIDEN  
+31 (0) 255 546 262  
info@cebo.com  
www.cebo.com

Revision date: 08-2017



