

Baroid Industrial Drilling Products
FIELD REFERENCE GUIDE



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The Difference...

Our Product Comes with our People.

Customer service providing technical and logistical expertise

Largest staff of field service reps to work onsite with contractors

The industry's largest retail distribution network

Extensive range of NSF Standard 60 certified products

Fifty continuous years of training the industry

Dedicated staff to ensure proper and timely order processing and material availability status, and to coordinate logistics and on-time/accurate billing



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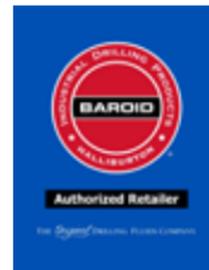
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**FOR QUESTIONS REGARDING PRODUCT APPLICATION AND PROPER PLACEMENT,
REFER TO THE PRODUCT DATA SHEET OR CONTACT YOUR LOCAL BAROID IDP REPRESENTATIVE.**

VISCOSIFIERS, GELLANTS

AQUAGEL® finely ground, premium-grade Wyoming sodium bentonite meets the requirements of the American Petroleum Institute (API) Specification 13A, section 9. AQUAGEL bentonite functions as a viscosifier and filtrate reducer in freshwater drilling fluids.

APPLICATION / FUNCTION

Viscosify water-based drilling fluids. Reduce filtration by forming a thin filter cake with low permeability.

ADVANTAGES

NSF/ANSI Standard 60 certified. Helps develop gel structure for cuttings suspension. Helps provide lubricity in drilling fluids.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
8.4 - 21.0	20.0 - 50.0	24.0 - 60.0

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of AQUAGEL viscosifier for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of AQUAGEL premium untreated sodium bentonite to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

AQUAGEL GOLD SEAL® premium, high-yielding Wyoming sodium bentonite contains no polymer additives or chemical treatments of any kind. AQUAGEL GOLD SEAL bentonite is a 200 mesh dry-powdered clay that can be added directly to fresh water or freshwater drilling fluids.

APPLICATION / FUNCTION

Can viscosify freshwater drilling fluids. Promotes hole stability in poorly consolidated formations.

ADVANTAGES

NSF/ANSI Standard 60 certified. Helps develop gel structure for cuttings suspension.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
8.4 - 21	20 - 50	24 - 60

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of AQUAGEL GOLD SEAL viscosifier for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of AQUAGEL GEL GOLD SEAL premium untreated sodium bentonite to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

BARAZAN® D PLUS viscosifier is premium quality, powdered Xanthan gum polymer that is used to viscosify fresh water, seawater and monovalent brines. BARAZAN D PLUS viscosifier is treated with a dispersant to promote the yield with reduced amounts of shear for improved mixing properties. BARAZAN D PLUS viscosifier has higher yield specifications and develops more viscosity and suspension than equivalent concentrations of BARAZAN or BARAZAN D viscosifiers. BARAZAN D PLUS viscosifier can be used up to 250°F (121°C).

APPLICATION / FUNCTION

Viscosify fresh water and brine-based fluids used in drilling, milling, underreaming and gravel packing operations. Suspend bridging agents and weighting materials in fresh water and the brine systems described above.

ADVANTAGES

Helps provide thixotropic properties and non-Newtonian flow characteristics over a wide salinity range at low concentrations. Helps provide excellent suspension without the need for clays. Helps minimize the potential for formation damage. Disperses easily in fresh water or brine with shear.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.1 - 2.1	0.25 - 5.0	0.3 - 6.0

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of BARAZAN D PLUS viscosifier for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of BARAZAN D PLUS viscosifier to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

BARO-GEL™ borehole stabilizer is a single sack fluid system specially formulated for use in horizontal directional drilling (HDD) and construction applications. BARO-GEL borehole stabilizer is a proprietary blended product using high-quality bentonite. When BARO-GEL borehole stabilizer is mixed with fresh water, it develops an easy-to-pump slurry with desirable fluid properties for HDD and construction applications.

APPLICATION / FUNCTION

Effective gel strength with minimum viscosity for cuttings suspension and transport. Enhanced borehole stability in poorly consolidated/cemented sands and gravel formations. Reduction in force required to advance pipe in microtunneling operations.

ADVANTAGES

Reduced viscosity development minimizes pump pressures. Helps provide increased lubricity for installation of product lines.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
10.5 - 21.0	25.0 - 50.0	30.0 - 60.0

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of BARO-GEL borehole stabilizer for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of BARO-GEL borehole stabilizer to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

BARO-GEL borehole stabilizer is a regionally sourced product and not commonly available through all Baroid IDP Distributors. Please contact your local Baroid IDP representative to confirm availability within your area of operations.

BIO-BORE™ 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.

APPLICATION / FUNCTION

Provide a clay-free drilling fluid. Minimized formation damage. Maximized recovery rate of contaminants during remediation. Enhanced viscosity for hole cleaning.

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 well-bore. Stable and yet biodegradable within a reasonable time frame depending on the surrounding environment.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
10.5 - 14.7	25.0 - 35.0	30.0 - 42.0

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of BIO-BORE HDD viscosifier for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of BIO-BORE HDD fluid concentrate to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

BORE-GEL® single-sack boring fluid system is specially formulated for use in horizontal directional drilling (HDD) applications. BORE-GEL fluid system is a proprietary blended product using high-quality Wyoming sodium bentonite. When BORE-GEL fluid system is mixed with fresh water, it develops an easy-to-pump slurry with desirable fluid properties for HDD.

APPLICATION / FUNCTION

Optimum gel strength for cuttings suspension and transport. Pumpable slurry with minimal viscosity. High reactive solids concentration for improved borehole stability in poorly consolidated/cemented sands and gravel formations.

ADVANTAGES

NSF/ANSI Standard 60 certified. Minimizes the number of boring fluid products required. Easy to mix and fast to yield. Low viscosity minimizes pump pressures. Provides lubricity for pulling product line.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
10.5 - 25.0	25.0 - 60.0	30.0 - 72.0

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of BORE-GEL for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of BORE-GEL boring fluid system to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

MUD-GEL® viscosifier is a finely ground, premium-grade bentonite that conforms to the American Petroleum Institute (API) Specification 13A, section 9 requirement. MUD-GEL viscosifier also functions as a filtrate reducer in freshwater drilling fluids.

APPLICATION / FUNCTION

Viscosified water-based drilling fluids. Reduced filtration by forming a thin filter cake with low permeability. Improved hole cleaning capabilities. Hole stability in poorly consolidated formations.

ADVANTAGES

Develops gel structure for cuttings suspension. Can be added directly to fresh water or freshwater drilling fluids. Provides lubricity in drilling fluids.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
8.4 - 21.0	20.0 - 50.0	24.0 - 60.0

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of MUD-GEL viscosifier for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of MUD-GEL viscosifier to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

MUD-GEL viscosifier is a regionally sourced product and not commonly available through all Baroid IDP Distributors. Please contact your local Baroid IDP representative to confirm availability within your area of operations.

NO-SAG® 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 enhancer is easily dispersible in fresh or brackish water.

APPLICATION / FUNCTION

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.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.1 - 2.1	0.25 - 5.0	0.3 - 6.0

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of NO-SAG suspension enhancer for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of NO-SAG suspension enhancer to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

QUIK-BORE™ high-yield boring fluid system is specially formulated for use in horizontal directional drilling (HDD), primarily tunneling and microtunneling applications. QUIK-BORE high-yield boring fluid system is a proprietary blended product using Wyoming sodium bentonite.

APPLICATION / FUNCTION

Provides functional gel strength for cuttings suspension. Improves borehole stability. Reduces filtration by forming a thin filter cake with low permeability. Lubricates pipe in microtunneling operations.

ADVANTAGES

High-yielding and easy to mix. Helps provide lubrication for pulling product line. Can be used in unconsolidated formations. Can provide gel strength to compensate for low annular velocity. Can minimize the number of boring fluid products required.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
8.0 - 15.0	20.0 - 35.0	24.0 - 42.0

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of QUIK-BORE high-yield boring fluid system for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of QUIK-BORE high yield boring fluid system to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

QUIK-GEL® viscosifier is an easy-to-mix, finely ground (200-mesh), premium-grade, high-yielding Wyoming sodium bentonite. QUIK-GEL viscosifier imparts viscosity, fluid loss control and gelling characteristics to freshwater-based drilling fluids.

APPLICATION / FUNCTION

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.

ADVANTAGES

NSF/ANSI Standard 60 certified. Single-sack product and cost effective. Can provide lubricity for drilling fluids. Can mix easily and quickly reaches maximum viscosity.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
5.0 - 15.0	12.0 - 35.0	14.0 - 42.0

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of QUIK-GEL viscosifier for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of QUIK-GEL viscosifier to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

QUIK-GEL GOLD® high-yield viscosifier is a selectively mined, premium sodium bentonite designed for water well, minerals exploration and other industrial drilling applications. QUIK-GEL GOLD high-yield viscosifier provides an optimized grind size which results in easy mixing and rapid hydration characteristics.

APPLICATION / FUNCTION

Viscosify freshwater-based drilling fluids. Form a low-solids, freshwater drilling fluid for general applications. Reduce filtration by forming a thin filter cake with low permeability.

ADVANTAGES

NSF/ANSI Standard 60 certified. Single-sack product and cost effective. Optimized grind size for enhanced mixing and yield.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
5.0 - 15.0	12.0 - 35.0	14.0 - 42.0

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of QUIK-GEL GOLD viscosifier for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of QUIK-GEL GOLD viscosifier to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

SHUR-GEL® drilling fluid conditioner is a finely ground, premium sodium bentonite additive designed to improve the properties of existing water based drilling fluids. SHUR-GEL drilling fluid conditioner may be used during well abandonment or as a stabilizer in monitoring or exploration boreholes.

APPLICATION / FUNCTION

Enhance freshwater-based drilling fluids to optimize borehole stability. Form an effective backfill slurry. Reduce filtration by forming a thin filter cake with low permeability. Form a low-solids drilling fluid for general drilling applications.

ADVANTAGES

Cost-effective, single-sack product. Easy to mix and quickly reaches maximum viscosity. Aids in reduction of rig time and project costs.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
10.5 - 21.0	25.0 - 50.0	30.0 - 60.0

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of SHUR-GEL viscosifier for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of SHUR-GEL viscosifier to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

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

APPLICATION / FUNCTION

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.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
5.0 - 15.0	12.0 - 35.0	14.0 - 42.0

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of TUNNEL-GEL PLUS viscosifier for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of TUNNEL-GEL PLUS viscosifier to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

TUNNEL-GEL PLUS viscosifier is a regionally sourced product and not commonly available through all Baroid IDP Distributors. Please contact your local Baroid IDP representative to confirm availability within your area of operations.

TUNNEL-GEL® 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 SW viscosifier assist in providing borehole stability, filtration control and improved carrying capacity in Drilled Shafts, Tunneling, Horizontal Directional Drilling and other construction applications.

APPLICATION / FUNCTION

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.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
8.4 - 15.0	20.0 - 35.0	24.0 - 42.0

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water (saline or freshwater) prior to the addition of TUNNEL-GEL SW viscosifier for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of TUNNEL-GEL SW viscosifier to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

XTRAGEL is a finely ground, modified universal grade bentonite. The product is manufactured to ensure ease of mixing and viscosity and gel building in fresh water. The product is designed for use in well drilling and civil construction applications.

APPLICATION / FUNCTION

Viscosify water-based drilling fluids. Build thin tough wall cake (filter cake). Reduce filtration into permeable formations. Provide suspension of drilled cuttings. Promote borehole stability in unconsolidated formations.

ADVANTAGES

Easy to mix. Rapid fluid viscosity development. Yields excellent fluid loss characteristics. Exhibits good lubricity.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
5.0 - 15.0	12.0 - 35.0	14.0 - 42.0

*1 bbl = 42 U.S. gals

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of XTRAGEL viscosifier for reduction of excess calcium and pH adjustment. Pre-mix XTRAGEL in fresh water and allow it to fully yield before drilling in saline or hard water.

The above are generalized concentrations of XTRAGEL viscosifier to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

XTRAGEL universal grade bentonite is a regionally sourced product and not commonly available through all Baroid IDP Distributors. Please contact your local Baroid IDP representative to confirm availability within your area of operations.

ZEOGEL® attapulgite clay can provide high yield and rheological stability in systems that contain large concentrations of salt. ZEOGEL viscosifier exceeds the API Specification 13A viscosity requirements.

APPLICATION / FUNCTION

ZEOGEL viscosifier can be used to build viscosity in drilling fluids having a high salt concentration.

ADVANTAGES

Resistant to common contaminants. Does not flocculate in the presence of salt.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
21.0 - 31.5	50.0 - 75.0	60.0 - 90.0

*1 bbl = 42 U.S. gals

The above are generalized concentrations of ZEOGEL attapulgite clay to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

GROUTS

AQUA-GROUT® and BENSEAL® grouting system combines AQUA-GROUT additive and BENSEAL bentonite provides a slurry for grouting casing and plugging boreholes. AQUA-GROUT is a specially formulated inorganic admixture for yield-rate control of bentonite slurries. BENSEAL is a specially processed granular Wyoming sodium bentonite. The AQUA-GROUT and BENSEAL slurry develops a high quality grout with low permeability. The AQUA-GROUT and BENSEAL system is a totally inorganic grout for use in all monitor and water well construction.

APPLICATION / FUNCTION

Seal and grout plastic and steel casings. Plug abandon exploration boreholes.

ADVANTAGES

Both products NSF/ANSI Standard 60 certified. Helps produce a high solids grout with in-situ swelling. Flexible seal providing low permeability that prevents commingling of aquifers and entry of surface contaminants.

RECOMMENDED TREATMENT

The AQUA-GROUT® and BENSEAL® system may be mixed and pumped with most conventional rig equipment. Avoid excessive mixing and shear when preparing slurry.

1. Pre-treat make-up water with Soda Ash to less than 100 mg/L total hardness
2. Add 2.5 lbs (1.1 kg or about 1 ½ qts) AQUA-GROUT additive to 20 gals (75.7 L) of fresh water and agitate thoroughly
3. Add one 50 lbs (22.7 kg) sack BENSEAL bentonite to the AQUA-GROUT additive and water mixture. Blend until solids are suspended
4. Once suspension of the solids is achieved continue to stir the slurry and pump the material downhole through tremie pipe (**Do not use a centrifugal pump**)

AQUAGUARD® single-sack grout containing granular Wyoming sodium bentonite is blended with inorganic additives. The grout is designed for sealing the annular space around monitor or water well casing.

APPLICATION / FUNCTION

Grout plastic and steel casings in monitor or water wells. Seal downhole instruments in test and observation holes. Seal cathodic protection installations.

ADVANTAGES

NSF/ANSI Standard 60 certified. Low-permeability, flexible seal helps prevent commingling of aquifers and entry of surface contaminants. Does not contain any polymers. No heat of hydration, no damage to plastic casing due to temperature elevations.

RECOMMENDED TREATMENT

1. Pre-treat make-up water with Soda Ash to less than 100 mg/L total hardness.
2. Add one 50 lbs (22.7 kg) sack of AQUAGUARD grouting material into 14 gals (53 L) of circulating fresh water over a 20 - 30 second interval.
The resulting slurry contains 30% active solids and has a slurry density of 10.1 lbs/gal, or 1.21 g/cm³.
3. Immediately tremie the grout into place after addition of AQUAGUARD grouting material.

Note: The slurry should contain suspended, unyielded bentonite granules which are allowed to hydrate and swell in situ.

Do not over mix and do not use a centrifugal pump.

BAROID® BENTONITE PELLETS sealing and plugging material are compressed, shaped pellets of high-swelling, untreated sodium bentonite. BAROID BENTONITE PELLETS are available in three sizes: 1/4", 3/8", and 1/2".

APPLICATION / FUNCTION

Seal or grout plastic or steel casing. Isolate screen intervals, subsurface instrumentation and sampling zones. Provide a protective interface between gravel pack and cement grout. Plug abandoned earthen boreholes and cavities.

ADVANTAGES

NSF/ANSI standard 60 certified. High swelling capacity in the presence of fresh water. No heat of hydration. Re-hydratable. After hydration, forms a semi-solid, flexible seal with permeability less than 1×10^{-8} cm/sec.

RECOMMENDED TREATMENT

1. Calculate the amount of BAROID BENTONITE PELLETS sealing and plugging material required.
2. Pour pellets slowly from the surface to minimize bridging. Pellets can be tremied into place when necessary.
3. Calculate and monitor pellet addition amounts to ensure proper hole fill by measuring the position of the top of the plug after every few pails.
Break up bridges as they occur.
4. Calculated volume should be applied to borehole.

BAROID® GRANULAR is a specially processed, 30-mesh sodium bentonite for use in sealing and grouting boreholes and earthen structures.

APPLICATION / FUNCTION

Helps seal leaking ponds and earthen structures. Mix with native soils to prepare a clay liner or cell for sewage lagoons, under storage tanks and landfills. Plug abandoned holes. Mix with native soils for use as backfill. Mix with water for slurry trenching.

ADVANTAGES

Effective in sealing and plugging. Simple to apply. Cost effective. Flexible seal providing low permeability. Prevent entry of pollutants from the surface.

RECOMMENDED TREATMENT

Sealing ponds or earthen structures

- Depending on the native soil, disc in or mix 3 - 5 lbs BAROID® GRANULAR sealing material per square foot (15 - 25 kg/m²).

To suspend cuttings while cable tool drilling

- Place BAROID GRANULAR sealing material in plastic bags. With the tools out of the hole, drop enough bags to get 6 - 10 lbs (2.7 - 4.5 kg) of BAROID GRANULAR sealing material to the bottom of hole. If hole is dry, add water. While drilling ahead, the churning action of the tools will form a thick slurry that will support the cutting off bottom and make it easier for the bailer to remove them.

BAROTHERM® GOLD thermally conductive grout is a bentonite material designed for use in grouting boreholes containing ground source heat loops, and related applications. BAROTHERM GOLD thermally conductive grout when combined with silica sand at various concentrations yields a grout with thermal conductivity values ranging between 0.4 and 1.2 BTU/hr·ft·°F (0.69 – 2.1 watts/m·°C).

APPLICATION / FUNCTION

A thermally conductive grout medium with low permeability for sealing ground source heat loops.

ADVANTAGES

NSF/ANSI Standard 60 Certified. Produces a uniform slurry for smooth pumping - no need to add extra water. Creates a low permeability seal.

RECOMMENDED TREATMENT

k Btu/hr·ft·°F	k watts/m·°C	Silica Sand (lbs/50 lbs)	Silica Sand (kg/22.7 kg)	Water (gal/50 lbs)	Water (L/22.7 kg)	Slurry Volume Yield (gals)	Slurry Volume Yield (L)	Density (lbs/gal)	Density (sg)	Total Solids
0.4	0.69	0	0	15.3	57.9	17.6	66.6	10.1	1.21	28.1%
0.69	1.2	100	45	15.3	57.9	22.2	84	12.5	1.50	54%
0.88	1.52	200	91	17.3	65.5	28.8	109	13.7	1.64	63.4%
1	1.73	250	113	18.3	69.3	32.1	121.5	14.1	1.69	66.3%
1.2	2.08	400	181	21	79.5	41.8	158.2	15.	1.80	72%

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of BAROTHERM GOLD thermally conductive grout for reduction of excess calcium and pH adjustment.

BENSEAL® granular (8-mesh), natural Wyoming sodium bentonite is used in the sealing and grouting of well casings and earthen structures. BENSEAL is not recommended for use as a drilling mud.

APPLICATION / FUNCTION

Seal or grout plastic or steel casings in monitor and water well construction. Seal or plug abandoned boreholes. Seal leaking ponds, ditches and dams. Soil stabilization. Aid in controlling loss of circulation.

ADVANTAGES

NSF/ANSI Standard 60 certified. High swelling capacity. Prevents commingling of aquifers and contamination from surface.

RECOMMENDED TREATMENT

As a casing drill and drive operation

1. Dig a cone-shaped depression around casing. Depression should be 6 - 8 in (152 - 203 mm) larger than the outside diameter of the casing and 2 - 3 ft (60 - 75 cm) deep.
2. Keep cone-shaped depression filled with dry BENSEAL while driving the casing.

When drilling and driving a 4" (102 mm) pipe, expect to use 2.5 lbs of BENSEAL® sealing and plugging agent per foot of hole or 3.7 kg/meter of hole.

The BENSEAL® and EZ-MUD® slurry combines two widely used Baroid products into a technique that provides a simple, economical method to seal and grout boreholes, well casings and earthen structures. The slurry develops a high quality grout with low permeability.

APPLICATION / FUNCTION

Seal or grout plastic and steel casings. Seal downhole instrumentation in test and observation holes. Stabilize broken or unconsolidated formations.

ADVANTAGES

Both products are NSF/ANSI Standard 60 certified. Develops strong bond between grout, casing and formation. Forms a flexible seal with a very low permeability that prevents commingling of aquifers and entry of surface contaminants.

RECOMMENDED TREATMENT

1. Accurately measure 24 U.S. gals (91 L) of fresh water. Pre-treat make-up water with Soda Ash to less than 100 mg/L total hardness.
2. With mixing paddles at high speed, add 8 - 10 fl oz (240 - 300 ml) of EZ-MUD liquid polymer to the pre-measured freshwater. With mixing paddles maintained at high speed, blend one sack of BENSEAL into EZMUD/water mixture. Rate of BENSEAL addition should be controlled; Normal application rate is 15 - 30 seconds/50 lbs (23 kg) bag. Mixing of grout should continue only long enough to achieve uniform suspension of granular BENSEAL within the EZ-MUD water mixture prior to pumping.
3. Pump BENSEAL and EZ-MUD slurry through a 1.0 - 1.25 in (25 - 32 mm) ID tremie pipe into hole without delay. Paddle stirring should be maintained at a moderate speed during active pumping to ensure continuous suspension of the granular BENSEAL.
4. For continuous grouting operations, pump until the grout returned at the surface is of the same consistency as the grout being pumped into the hole.

Do not over mix and do not use a centrifugal pump.

BORE-GROUT™ horizontal heat loop grout is a bentonite material designed for use in grouting boreholes containing horizontally installed ground source heat loops. BORE-GROUT horizontal heat loop grout is also used where a grout is required to be placed around a horizontally installed product line. BORE-GROUT horizontal heat loop grout is designed to be mixed and pumped neat with standard horizontal directional drilling (HDD) rig equipment.

Alternately, silica sand may be added to BORE-GROUT horizontal bentonite grout to increase the thermal conductivity, up to 1.2 BTU/hr-ft-°F (0.69 – 2.08 watts/m-°C). Sand-enhanced BORE-GROUT horizontal heat loop grout systems will require dedicated grouting equipment for mixing and placement. BORE-GROUT horizontal heat loop grout should only be used in the saturated zone.

APPLICATION / FUNCTION

A thermally conductive grout medium with low permeability for sealing ground source heat loops installed in horizontal bores.

ADVANTAGES

NSF/ANSI Standard 60 Certified. Promotes efficient heat transfer. Produces a uniform slurry for smooth pumping - No need to add extra water.

RECOMMENDED TREATMENT

The recommended treatment is to mix one 50 lbs (23 kg) bag of BORE-GROUT horizontal heat loop grout in 20 gals (75.7 L) of water

k Btu/hr-ft-°F	k watts/m-°C	Silica Sand (lb/50 lb bag)	Silica Sand (kg/23 kg bag)	Water (gal/50 lb bag)	Water (L/23 kg bag)	Slurry Volume Yield (gals)	Slurry Volume Yield (L)	Density (lbs/gal)	Specific Gravity
0.4	0.69	0.0	0.0	20.0	75.7	22.3	84.4	9.7	1.17

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of BORE-GROUT horizontal heat loop grout for reduction of excess calcium and pH adjustment.

CASING SEAL™ sealing and plugging material is a mixture of random sized particles of a utility grade, granular Wyoming sodium bentonite, a naturally occurring, non-treated swellable clay. Because of its high swelling capacity, CASING SEAL bentonite is an effective sealing material for sealing a leaking pond, and for use as a clay liner.

APPLICATION / FUNCTION

Seal leaking ponds and dams. Seal earthen structures. Prepare a clay liner under storage tanks and landfills. Lubricate casing while being driven.

ADVANTAGES

NSF/ANSI Standard 60 Certified. Flexible seal providing low permeability that prevents commingling of aquifers and entry of surface contaminants.

RECOMMENDED TREATMENT

1. Accurately measure 24 U.S. gals (91 L) of fresh water. Pre-treat make-up water with Soda Ash to less than 100 mg/L total hardness.
2. With mixing paddles at high speed, add 8 - 10 fl oz (240 - 300 ml) of EZ-MUD® liquid polymer to the pre-measured freshwater. With mixing paddles maintained at high speed, blend one sack of CASING SEAL into EZMUD/water mixture. Rate of CASING SEAL addition should be controlled; Normal application rate is 15 - 30 seconds/50 lbs (23 kg) bag. Mixing of grout should continue only long enough to achieve uniform suspension of granular CASING SEAL within the EZ-MUD water mixture prior to pumping.
3. Pump CASING SEAL and EZ-MUD slurry through a 1.0 - 1.25 in (25 - 32 mm) ID tremie pipe into hole without delay. Paddle stirring should be maintained at a moderate speed during active pumping to ensure continuous suspension of the granular CASING SEAL.
4. For continuous grouting operations, pump until the grout returned at the surface is of the same consistency as the grout being pumped into the hole.

Do not over mix and do not use a centrifugal pump.

EXB-PLUG™ sealing and plugging material is compressed, shaped bentonite pellets.

APPLICATION / FUNCTION

Seal or grout plastic or steel casing. Isolate screen intervals, subsurface instrumentation, and sampling zones. Provide a protective interface between gravel pack and cement grout.

ADVANTAGES

High swelling capacity in the presence of fresh water. No heat of hydration. Re-hydratable. After hydration, forms a semi-solid, flexible seal with low permeability.

RECOMMENDED TREATMENT

1. Calculate the amount of EXB-PLUG sealing and plugging material required.
2. Pour pellets slowly from the surface to minimize bridging. Pellets can be tremied into place when necessary.
3. Calculate and monitor pellet addition amounts to ensure proper hole fillby measuring the position of the top of the plug after every few pails.
Break up bridges if they occur.
4. Calculated volume should be applied to borehole.

*EXB-PLUG sealing and plugging material is a regionally sourced product and not commonly available through all Baroid IDP Distributors.
Please contact your local Baroid IDP representative to confirm availability within your area of operations.*

EZ-SEAL® one-sack granular bentonite product is intended for use as an easily mixed grouting and plugging material.

APPLICATION / FUNCTION

Sealing or grouting of plastic and steel casings. Plugging abandoned boreholes and filling earthen cavities. Grouting of loops for ground source heat pumps. Reduction of lost circulation. Stabilization of broken and unconsolidated formations.

ADVANTAGES

NSF/ANSI Standard 60 certified. Easy to mix and apply, just add fresh water. Flexibility in application rate and grout set time. Good structural integrity.

RECOMMENDED TREATMENT

% Solids grout	15.0	20.0	23.0
Water, gal	33.0	24.0	20.0
Water, Liters	125.0	91.0	76.0
Yield volume, gal	35.3	26.3	22.3
Yield volume, Liters	133.6	99.6	84.4

*Once EZ-SEAL bentonite is added to the mixing water, the slurry will have an "oatmeal consistency" containing un-yielded and partially hydrated bentonite granules. It is recommended the product be blended only long enough to gain suspension of the EZ-SEAL material. Immediately tremie the grout into place to allow the bentonite granules to hydrate and swell in situ. **Do not over mix and do not use a centrifugal pump.***

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of EZ-SEAL granular bentonite for reduction of excess calcium and pH adjustment.

HOLEPLUG® naturally occurring Wyoming sodium bentonite clay is a sized and graded chip material used to seal and plug earthen boreholes. HOLEPLUG bentonite is available in two particle size grades:

HOLEPLUG® 3/4" bentonite (100% of particles pass through 3/4" screen; all particles retained on 3/8" screen)

HOLEPLUG® 3/8" bentonite (100% of particles pass through 3/8" screen; all particles retained on 1/4" screen)

APPLICATION / FUNCTION

Grouting annulus in all types of wells, particularly environmental monitoring well applications. Sealing above gravel packs. Plugging decommissioned boreholes. Stemming shotholes. Sealing around conductor pipe.

ADVANTAGES

NSF/ANSI Standard 60 certified. Helps prevent entry of surface water into boreholes. High swelling potential. In situ swelling to provide a superior seal with excellent casing stabilization. Helps prevent vertical movement of fluids in the hole between porous zones.

RECOMMENDED TREATMENT

Due to shipping and handling, a small amount of fine bentonite particles may be present. For optimum results, HOLEPLUG bentonite should be poured over a mesh or screen with 1/4" (6.4 mm) openings to "sift out" the smaller particles. The screen should be large enough (approx. 1 yd² or 1m²) to be folded into a "V" shape to allow sifting while the product is being poured into the hole. Also, HOLEPLUG bentonite should be poured slowly.

Allow approximately two minutes to pour a 50 lbs (22.7 kg) bag.

QUIK-GROUT® one-sack grouting and plugging material is a sodium bentonite-based grout designed for grouting water wells, monitoring wells and for plugging boreholes. QUIK-GROUT grouting and plugging material does not contain any polymers.

APPLICATION / FUNCTION

Can seal or grout plastic and steel casings. Can seal downhole instrumentation in test and observation holes. Can plug abandoned boreholes and earthen cavities. Not recommended for use as a cement additive.

ADVANTAGES

Easy-to-use one sack grout. Dust-free mixing. Can be mixed and pumped using conventional rig equipment. Rehydratable.

RECOMMENDED TREATMENT

- For maximum results, pre-treat make-up water with Soda Ash to less than or equal to 100 mg/L total hardness and to a pH range of 8.5 - 9.5.
- The recommended mixing rate is one 50 lbs (23 kg) sack of QUIK-GROUT grouting and plugging material per 24 gals (91 L) of fresh water to create a 20% active solids by weight grout with a density of 9.4 lbs/gal or 1.13 sg.

QUIK-SET gypsum cement is designed to provide accelerated formation of a high strength support or plugging material.

APPLICATION / FUNCTION

Used to accelerate the set of Portland cements. Cement pre-collars in place. Plug off lost circulation zones. Set as a plug for wedging operations.

ADVANTAGES

Quick setting time. Reduces rig idle times. Develops high strength quickly.

RECOMMENDED TREATMENT

Recommended Water Requirement:

- 0.4 - 0.625 L/kg of QUIK-SET cement

Recommended Mixing Ratio:

- 8.0 - 12.5 L/20 kg of QUIK-SET cement

Temperature and quality of water may affect ultimate set time of QUIK-SET cement.

QUIK-SET gypsum cement is a regionally sourced product and not commonly available through all Baroid IDP Distributors.

Please contact your local Baroid IDP representative to confirm availability within your area of operations.

RAPID SET 5 specially formulated fast setting, high strength cement.

APPLICATION / FUNCTION

Near surface applications including R/C, diamond and water well applications for loss of circulation or cementing pre-collar casing.

ADVANTAGES

Easy one product mix. Quick setting time, reduces rig idle times. Develops high strength quickly.

RECOMMENDED TREATMENT

Add 12 L water to each 15 kg pail.

RAPID SET 5 specially formulated fast setting high strength cement is a regionally sourced product and not commonly available through all Baroid IDP Distributors. Please contact your local Baroid IDP representative to confirm availability within your area of operations.

FILTRATION CONTROL ADDITIVES

DEXTRID® filtration control agent is a modified and bacterially stabilized starch product used to provide filtration control with minimum viscosity buildup in water-based drilling fluids. Through its coating mechanism, DEXTRID filtration control agent helps reduce dispersion of clay particles and stabilize reactive formations.

APPLICATION / FUNCTION

Filtration control in water-based drilling fluids. Reduced filtration rate without significant increase in fluid viscosity. Borehole stability in water sensitive formations. Improves core recovery.

ADVANTAGES

Effective in fresh water, salt water and brackish water environments. Minimal viscosity increase. Helps decrease clay dispersion.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
1.0 - 6.0	2.4 - 14.3	2.9 - 17.0

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of DEXTRID filtration control agent for reduction of excess calcium and pH adjustment

The above are generalized concentrations of DEXTRID filtration control agent to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

LIQUI-TROL™ viscosifier is a liquid suspension of a modified natural cellulosic polymer, in an ultra-clean oil. LIQUI-TROL viscosifier of polymer, when added to a QUIK-GEL® or BORE-GEL® slurry, yields a drilling mud system suitable for drilling in water sensitive formations.

APPLICATION / FUNCTION

Can provide filtration control in fresh or brackish water-based drilling fluids. Can promote borehole stability in water sensitive formations. Can pour a slug of concentrate into drill string directly to sweep the hole.

ADVANTAGES

Effective in fresh water, salt water and brackish water-based drilling fluids. Effective in small quantities for filtration control. Non-fermenting.

RECOMMENDED TREATMENT

Quarts/bbl*	Quarts/100 gals	Liters/m ³
0.5 - 2.5	1.0 - 6.0	2.5 - 15.0

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of LIQUI-TROL modified cellulosic polymer suspension for reduction of excess calcium and pH adjustment.

Highly saline waters may require twice as much LIQUI-TROL modified cellulosic polymer suspension as fresh water. Preferably, LIQUI-TROL modified cellulosic polymer suspension should be mixed in freshwater before it is added to salty water.

The above are generalized concentrations of LIQUI-TROL modified cellulosic polymer suspension to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

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 QUIK-GEL® or BORE-GEL® bentonite slurry, yields a fluid 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.

APPLICATION / FUNCTION

Filtration control in fresh or brackish water-based drilling fluids. Encapsulation of shale to prevent swelling and disintegration. Borehole stability in water sensitive formations.

ADVANTAGES

Effective in fresh water, salt water and brackish water-based drilling fluids. Effective in small quantities for filtration control. Non-fermenting.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.25 - 3.0	0.6 - 7.0	0.7 - 8.4

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of PAC-L low viscosity polyanionic cellulose polymer for reduction of excess calcium and pH adjustment.

Highly saline waters may require twice as much PAC-L low viscosity polyanionic cellulose polymer as fresh water. Preferably, PAC-L low viscosity polyanionic cellulose polymer should be mixed in freshwater before it is added to salty water.

The above are generalized concentrations of PAC-L low viscosity polyanionic cellulose polymer to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

PAC™-R modified natural cellulosic polymer provides filtration control in most water-based drilling fluids. PAC-R additive, when added to a QUIK-GEL® 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.

APPLICATION / FUNCTION

Filtration control in fresh or brackish water-based drilling fluids. Borehole stability in water sensitive formations. Decrease rotational torque and circulating pressure. Improve hole cleaning and core recovery.

ADVANTAGES

Effective in fresh, brackish and salt-water based drilling fluids. Effective in small quantities for filtration control. Non-fermenting.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.25 - 2.0	0.6 - 5.0	0.7 - 6.0

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of PAC-R polyanionic cellulose polymer for reduction of excess calcium and pH adjustment.

Highly saline waters may require twice as much PAC-R polyanionic cellulose polymer as fresh water. Preferably, PAC-R polyanionic cellulose polymer should be mixed in freshwater before it is added to salty water.

The above are generalized concentrations of PAC-R polyanionic cellulose polymer to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

QUIK-TROL® GOLD highly dispersible polyanionic cellulosic (PAC) polymer provides ease of mixing and improved filtration control in most water-based drilling fluids. QUIK-TROL GOLD highly dispersible polymer, when added to an AQUAGEL®, QUIK-GEL® or BORE-GEL® slurry, yields a low filtrate drilling fluid system suitable for drilling in water sensitive formations.

APPLICATION / FUNCTION

Filtration control in water-based drilling fluids. Borehole stability in water sensitive formations. Minimized rotational torque and circulating pressure.

ADVANTAGES

NSF/ANSI Standard 60 certified. Disperses readily in water, even with low shear. Effective in fresh, salt and brackish water-based drilling fluids. Efficiently improves filtration control-effective at low concentrations. Non-fermenting.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.1 - 2.0	0.25 - 5.0	0.3 - 6.0

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of QUIK-TROL GOLD highly dispersible polyanionic cellulose polymer for reduction of excess calcium and pH adjustment.

Highly saline waters may require twice as much QUIK-TROL GOLD highly dispersible polyanionic cellulose polymer as fresh water. Preferably, QUIK-TROL GOLD highly dispersible polyanionic cellulose polymer should be mixed in freshwater before it is added to salty water.

The above are generalized concentrations of QUIK-TROL GOLD highly dispersible polyanionic cellulose polymer to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

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 an AQUAGEL®, QUIK-GEL® or BORE-GEL® slurry, yields a low filtrate drilling fluid system suitable for drilling in water sensitive formations.

APPLICATION / FUNCTION

Filtration control in fresh or brackish water-based drilling fluids. Borehole stability in water sensitive formations. Encapsulation of shale to prevent swelling and disintegration.

ADVANTAGES

NSF/ANSI Standard 60 certified. Disperses readily in water, even with low shear. Effective in fresh, salt and brackish water-based drilling fluids. Resistant to harsh environments and contaminants.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.25 - 3.0	0.6 - 7.0	0.7 - 8.4

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of QUIK-TROL GOLD LV highly dispersible polyanionic cellulose polymer for reduction of excess calcium and pH adjustment.

Highly saline waters may require twice as much QUIK-TROL GOLD LV highly dispersible polyanionic cellulose polymer as fresh water. Preferably, QUIK-TROL GOLD LV highly dispersible polyanionic cellulose polymer should be mixed in freshwater before it is added to salty water.

The above are generalized concentrations of QUIK-TROL GOLD LV highly dispersible polyanionic cellulose polymer to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

CLAY & SHALE STABILIZERS

CLAY-DRILL™ is a single sack dry product designed for short length HDD applications. This polymer-based HDD fluid is designed to provide bore-hole stabilization, counteract the sticking tendencies of clay, and maximize clay/shale inhibition without the need for additional additives.

APPLICATION/FUNCTION

Stabilizes reactive clay and shale formations, builds a clay-free drilling fluid, reduces or eliminates bit and reamer balling, minimizes differential sticking

ADVANTAGES

NSF/ANSI Standard 60 certified. Reduces the number of products on site, single sack product with no additives needed, effective at low concentrations, helps inhibit shale swelling and disintegration.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.294 - 0.714	0.7 - 1.7	0.6 - 1.2

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of CLAY-DRILL polymer based HDD fluid for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of CLAY-DRILL polymer based HDD fluid to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

EZ-MUD® liquid polymer emulsion contains partially hydrolyzed polyacrylamide/polyacrylate (PHPA) copolymer and is used primarily as a borehole stabilizer to prevent reactive shale and clay from swelling and sloughing. EZ-MUD 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.

APPLICATION / FUNCTION

Stabilize reactive shale and clay formations. Improve borehole stability. Enhance slurry rheological properties. Alleviate mud rings, bit balling and booting-off in clay formations.

ADVANTAGES

NSF/ANSI Standard 60 certified. Mixes easily with minimum shear in fresh water. Helps provide effective clay and shale stabilization with lower viscosity. Helps impart high degree of lubricity.

RECOMMENDED TREATMENT

Pints/bbl*	Quarts/100 gals	Liter/m ³
0.5 - 2.5	0.6 - 3.0	1.5 - 7.5

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of EZ-MUD liquid polymer emulsion for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of EZ-MUD liquid polymer emulsion to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

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

APPLICATION / FUNCTION

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.

ADVANTAGES

NSF/ANSI Standard 60 certified. Can disperse easily with minimal shear. Efficient shale/clay stabilizer and viscosifier. Helps impart high degree of lubricity.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.35 - 0.75	0.8 - 1.8	1.0 - 2.0

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of EZ-MUD DP borehole stabilizing dry polymer for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of EZ-MUD DP borehole stabilizing dry polymer to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

EZ-MUD® GOLD clay and shale stabilizer provides inhibition of clay and shale formations in water-based drilling fluids without substantially increasing viscosity. EZ-MUD GOLD stabilizer, when added to a QUIK-GEL® or BORE-GEL® slurry, yields an inhibitive drilling fluid system while maintaining manageable and effective fluid properties. EZ-MUD GOLD stabilizer can be mixed easily at minimal shear thereby eliminating the need for liquid emulsions.

APPLICATION / FUNCTION

Enhanced rheological properties of a low-solids drilling mud. Clay and shale stabilization to prevent swelling and/or dispersion. Borehole stability in water sensitive formations. Minimized rotational torque and circulating pressure.

ADVANTAGES

NSF/ANSI Standard 60 certified. Easy dispersion and mixing with minimal shear. Can be used at increased concentrations to gain inhibition without producing excess viscosity. No petroleum distillates present.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.2 - 1.0	0.5 - 2.4	0.6 - 2.85

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of EZ-MUD GOLD clay and shale stabilizer for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of EZ-MUD GOLD clay and shale stabilizer to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

EZ-MUD® 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 PLUS polymer emulsion is also added to low-solids drilling fluids to increase lubricity and to improve the carrying capacity of air/foam injection fluids. EZ-MUD PLUS polymer emulsion is a high molecular weight version of EZ-MUD polymer emulsion with improved properties.

APPLICATION / FUNCTION

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.

ADVANTAGES

NSF/ANSI Standard 60 certified. Liquid form – mixes easily with minimum shear in fresh water. Efficient shale/clay stabilizer and viscosifier.

RECOMMENDED TREATMENT

Pints/bbl*	Quarts/100 gals	Liter/m ³
0.5 - 1.8	0.6 - 2.0	1.5 - 5.0

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of EZ-MUD PLUS liquid polymer emulsion for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of EZ-MUD PLUS liquid polymer emulsion to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

QUIK MUD® GOLD readily dispersible clay and shale stabilizer provides inhibition of clay and shale formations in water-based drilling fluids without substantially increasing viscosity. QUIK MUD® GOLD clay and shale stabilizer, when added to a QUIK-GEL® or BORE-GEL® slurry, yields an inhibitive drilling fluid system while maintaining manageable and effective fluid properties. QUIK MUD® GOLD clay and shale stabilizer is a readily dispersible, free-flowing granule.

APPLICATION / FUNCTION

Clay and shale stabilization to prevent swelling and/or dispersion. Borehole stability in water sensitive formations. Improved core recovery in continuous wireline coring operations.

ADVANTAGES

Allows use of high concentrations to gain inhibition without producing excess viscosity. Non-fermenting.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.2 - 1.0	0.5 - 2.4	0.6 - 2.85

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of QUIK MUD® GOLD readily dispersible clay and shale stabilizer for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of QUIK MUD® GOLD readily dispersible clay and shale stabilizer to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

POLY-BORE™ PLUS stabilizing agent is a free flowing, water-soluble, easy mixing, 100% active, dry granular polymer. POLY-BORE™ PLUS stabilizing agent is a very high molecular weight partially hydrolyzed polyacrylamide (PHPA) polymer. When mixed with fresh water, a small quantity can provide a clear, solid-free, viscous borehole stabilizing fluid for use in drilled shaft, auger drilling, horizontal directional boring, trenching excavation and reverse circulation (RC) rotary drilling. It is not designed to be used in conjunction with bentonite based fluids.

APPLICATION / FUNCTION

Builds a clay-free boring fluid. Stabilize reactive clay and shale formations. Enhance core recovery in continuous wireline coring operations. Provide high cohesiveness to bind excavated sandy soil and gravel.

ADVANTAGES

NSF/ANSI Standard 60 certified. Can disperse easily with minimal shear. Efficient shale/clay stabilizer and viscosifier. Does not require solids control unit to clean the slurry. Helps maintain a stable and gauge borehole. Helps maximize skin friction and ultimate end bearing capacity for a drilled shaft.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.2 - 0.6	0.5 - 1.5	0.6 - 1.8

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of POLY-BORE™ PLUS borehole stabilizing agent for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of POLY-BORE™ PLUS borehole stabilizing agent to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

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

APPLICATION / FUNCTION

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

ADVANTAGES

NSF/ANSI Standard 60 Certified. Can disperse easily with minimal shear. Efficient shale/clay stabilizer and viscosifier. Helps impart high degree of lubricity. Non-fermenting.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.35 - 0.75	0.8 - 1.8	1.0 - 2.0

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of EZ-MUD® DP GOLD borehole stabilizing dry polymer for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of EZ-MUD® DP GOLD borehole stabilizing dry polymer to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

POLY-BORE™ stabilizing agent is a free flowing, water-soluble, easy mixing, 100% active, dry granular polymer. POLY-BORE stabilizing agent is a very high molecular weight partially hydrolyzed polyacrylamide (PHPA) polymer. When mixed with fresh water, a small quantity of POLY-BORE stabilizing agent can provide a clear, solid-free, viscous borehole stabilizing fluid for use in drilled shaft, auger drilling, horizontal directional boring, trenching excavation and reverse circulation (RC) rotary drilling. POLY-BORE stabilizing agent is not designed to be used in conjunction with bentonite based fluids.

APPLICATION / FUNCTION

Build a clay-free boring fluid. Stabilize reactive clay and shale formations. Enhance core recovery in continuous wireline coring operations.

ADVANTAGES

Can disperse easily with minimal shear. Efficient shale/clay stabilizer and viscosifier. Does not require solids control unit to clean the slurry. Helps maintain a stable and gauge borehole.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.2 - 0.6	0.5 - 1.5	0.6 - 1.8

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of POLY-BORE borehole stabilizing agent for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of POLY-BORE borehole stabilizing agent to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

QUIK MUD® liquid polymer is a partially hydrolyzed polyacrylamide/polyacrylate (PHPA) copolymer and emulsion.

APPLICATION / FUNCTION

Can be added to low-solids drilling fluids to prevent reactive shale and clay from swelling and sloughing, increase lubricity, fluid viscosity and to improve carrying capacity of air/foam injection fluids.

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 household bleach (sodiumhypochlorite).

RECOMMENDED TREATMENT

Pints/bbl*	Quarts/100 gals	Liter/m ³
0.5 - 2.0	0.6 - 2.5	1.5 - 6.3

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of QUIK MUD liquid polymer emulsion for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of QUIK MUD liquid polymer emulsion to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

QUIK MUD liquid polymer emulsion is a regionally sourced product and not commonly available through all Baroid IDP Distributors. Please contact your local Baroid IDP representative to confirm availability within your area of operations.

QUIK MUD® D-50 liquid polymer dispersion is a high solids, partially hydrolyzed polyacrylamide/polyacrylate (PHPA) copolymer used primarily as a viscosifier and borehole stabilizer to prevent reactive shale and clay from swelling and sloughing. QUIK MUD D-50 liquid polymer dispersion can be used

to provide friction reduction, inhibition and lubricity in freshwater, KCl and saltwater based drilling fluids.

APPLICATION / FUNCTION

Viscosity development in fresh water drilling fluids. Clay and shale stabilization to prevent swelling and/or dispersion. Reduce rotational torque and circulating pressure.

ADVANTAGES

Can be mixed easily with minimum shear in fresh water. Efficient and cost effective – small amounts produce desired results. Can be broken down chemically with bleach (sodium hypochlorite).

RECOMMENDED TREATMENT

Pints/bbl*	Quarts/100 gals	Liter/m ³
0.5 - 2.0	0.6 - 2.5	1.5 - 6.3

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of QUIK MUD D-50 liquid polymer dispersion for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of QUIK MUD D-50 liquid polymer dispersion to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

QUIK MUD® GOLD clay and shale stabilizer provides inhibition of clay and shale formations in water-based drilling fluids without substantially increasing viscosity. QUIK MUD GOLD clay and shale stabilizer, when added to a QUIK-GEL® or BORE-GEL® slurry, yields an inhibitive drilling fluid system while maintaining manageable and effective fluid properties.

APPLICATION / FUNCTION

Enhanced rheological properties of a low-solids drilling fluid. Clay and shale stabilization to prevent swelling and/or dispersion. Borehole stability in water sensitive formations.

ADVANTAGES

NSF/ANSI Standard 60 certified. Allows use of high concentrations to gain inhibition without producing excess viscosity. No petroleum distillates. Non-fermenting.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.2 - 1.0	0.5 - 2.4	0.6 - 2.85

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of QUIK-MUD GOLD clay and shale stabilizer for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of QUIK-MUD GOLD clay and shale stabilizer to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

FOAMING AGENTS & SURFACTANTS

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.

APPLICATION / FUNCTION

Improve hole-cleaning capability of airstream. Increase borehole stability. Increase the ability to lift large volumes of water.
Reduce air-volume requirement.

ADVANTAGES

NSF/ANSI Standard 60 certified. Elevated flash point for easier shipment. High quality, high expansion foam with a consistency similar to shaving foam. High stability with excellent retention time.

RECOMMENDED TREATMENT

% by Volume	Gallons/100 gals	Liter/m ³
0.5 - 2.0	0.5 - 2.0	5.0 - 20.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of AQF-2 foaming agent for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of AQF-2 foaming agent to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

BDF-368™ foaming agent is an anionic surfactant which can be added to fresh water for air/foam, air/gel-foam or mist drilling applications.

APPLICATION / FUNCTION

Improve hole-cleaning capability of airstream. Increase borehole stability. Increase the ability to lift large volumes of water.

Reduce air-volume requirement.

ADVANTAGES

Enhance the efficiency of cuttings removal. Reduce the sticking tendencies of wet clays, minimizing the risk of mud rings and wall packing. Reduce erosion of poorly consolidated formations.

RECOMMENDED TREATMENT

% by Volume	Gallons/100 gals	Liter/m ³
0.5 - 2.0	0.5 - 2.0	5.0 - 20.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of BDF-368 foaming agent for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of BDF-368 foaming agent to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed please, refer to the Product Data Sheet or contact your local Baroid IDP representative.

BDF-368 foaming agent is a regionally sourced product and not commonly available through all Baroid IDP Distributors. Please contact your local Baroid IDP representative to confirm availability within your area of operations.

CON DET® 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.

APPLICATION / FUNCTION

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.

RECOMMENDED TREATMENT

% by Volume	Quarts/100 gals	Liter/m ³
0.125 - 1.0	0.5 - 4.0	1.25 - 10.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of CON DET wetting agent for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of CON DET wetting agent to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

IDP-404 wetting agent is a biodegradable proprietary blend of anionic surfactants formulated for use in fresh water, salt water and in low-solids drilling fluids. It counteracts the sticking tendencies of clays, reducing wall packing, bit balling, booting-off and mud ring formation.

APPLICATION / FUNCTION

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. Biodegradable. Compatible with other Baroid products.

RECOMMENDED TREATMENT

% by Volume	Quarts/100 gals	Liter/m ³
0.25 - 1.5	1.0 - 6.0	2.5 - 15.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of IDP-404 wetting agent for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of IDP-404 wetting agent to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

IDP-404 wetting agent is a regionally sourced product and not commonly available through all Baroid IDP Distributors. Please contact your local Baroid IDP representative to confirm availability within your area of operations.

IDP-604 foaming agent is anionic surfactant designed to create an effective and stable foam in fresh, hard or saltwater environments.

APPLICATION / FUNCTION

Stable foam development in brackish or saltwater conditions. Improved hole cleaning capability of the airstream and reduced air volume requirement.

ADVANTAGES

Effective in fresh water, hard water and brine-based fluids. Stable at elevated down hole temperatures. Effective stability with enhanced retention time. Elevated flashpoint for easier shipment.

RECOMMENDED TREATMENT

% by Volume	Gallons/100 gals	Liter/m ³
0.5 - 2.0	0.5 - 2.0	5.0 - 20.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of IDP-604 saltwater tolerant foaming agent for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of IDP-604 saltwater tolerant foaming agent to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

MUD DET wetting agent is a proprietary blend of surfactants that is specially formulated for use in fresh water, low-solids drilling fluids.

APPLICATION / FUNCTION

Keep the drill bit clean. Slow breakup of cutting 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.

ADVANTAGES

Effective in low concentrations. Easy to mix with water.

RECOMMENDED TREATMENT

% by Volume	Quarts/100 gals	Liter/m ³
0.25 - 1.5	1.0 - 6.0	2.5 - 15.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of MUD DET wetting agent for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of MUD DET wetting agent to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

MUD DET wetting agent is a regionally sourced product and not commonly available through all Baroid IDP Distributors. Please contact your local Baroid IDP representative to confirm availability within your area of operations.

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

APPLICATION / FUNCTION

Reduce or eliminate bit balling. Reduce surface tension of drilling fluid, which allows faster chip removal without continuously grinding the hard shale formations. Improve drilling efficiency by preferentially coating the bottom-hole assembly and drill string.

ADVANTAGES

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

RECOMMENDED TREATMENT

% by Volume	Quarts/100 gals	Liter/m ³
0.25 - 1.0	1.0 - 4.0	2.5 - 10.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of PENETROL non-ionic wetting agent for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of PENETROL non-ionic wetting agent to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

QUIK-FOAM® foaming agent is a proprietary blend of biodegradable surfactants that can be added to fresh, brine or brackish water for air/foam, air/gel-foam or mist drilling applications.

APPLICATION / FUNCTION

Enhance the rate of cuttings removal. Increase the ability of lifting large volumes of water. Improve hole-cleaning capability of the airstream.

ADVANTAGES

NSF/ANSI Standard 60 Certified. High quality, high expansion foam with a consistency similar to shaving foam. Versatile and compatible with various types of make-up water.

RECOMMENDED TREATMENT

% by Volume	Quarts/100 gals	Liter/m ³
0.5 - 2.0	0.5 - 2.0	5.0 - 20.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of QUIK-FOAM high performance foaming agent for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of QUIK-FOAM high performance foaming agent to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

ULTRAFOAM™, biodegradable mixture of anionic surfactants and foaming agents can be added to fresh, hard or high salinity water for air/foam, air/gel-foam or mist drilling applications.

APPLICATION / FUNCTION

Enhance the rate of cuttings removal. Increase the ability of lifting large volumes of water. Improve hole-cleaning capability of the airstream. Reduce the sticking tendencies of wet clays, thereby eliminating mud rings and wall packing.

ADVANTAGES

Produces high quality foam at low concentrations. Highly stable foam with excellent retention time.

RECOMMENDED TREATMENT

% by Volume	Gallons/100 gals	Liter/m ³
0.5 - 2.0	0.5 - 2.0	5.0 - 20.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of ULTRAFOAM anionic foaming agent for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of ULTRAFOAM anionic foaming agent to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

ULTRAFOAM anionic foaming agent is a regionally sourced product and not commonly available through all Baroid IDP Distributors. Please contact your local Baroid IDP representative to confirm availability within your area of operations.

LOST CIRCULATION MATERIALS

BAROLIFT® hole cleaning aid contains chemically inert, temperature stable, synthetic fiber material which is used as a hole cleaning and suspension aid in HDD, Minerals Exploration and other industrial drilling applications.

APPLICATION / FUNCTION

Enhance suspension properties and carrying capacity of drilling fluid without increasing viscosity. Reduce loss of circulation or seepage to formation.

Effective as drilling fluid component or as a sweep material.

ADVANTAGES

Does not affect chemistry of drilling fluid. Mixes easily and uniformly through the mud hopper. Easily removed by screened solids control equipment. Does not increase viscosity.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.05 - 0.1	0.125 - 0.25	0.15 - 0.3

*1 bbl = 42 U.S. gallons

The above are generalized concentrations of BAROLIFT hole cleaning aid to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

DIAMOND SEAL® lost circulation material is a 100% active, water-swellable, synthetic polymer. DIAMOND SEAL polymer LCM absorbs hundreds of times its own weight in water. It is intended for use primarily as a lost circulation material for horizontal directional drilling (HDD).

APPLICATION / FUNCTION

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.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
4.2 - 8.4	10.0 - 20.0	12.0 - 24.0

*1 bbl = 42 U.S. gallons

DIAMOND SEAL absorbent polymer for loss of circulation is not meant for continuous use in the active circulating system and is intended for focused, spot treatments or slugs for combatting loss of circulation.

Prior to pumping DIAMOND SEAL absorbent polymer for loss of circulation, be sure to remove all in-line screens in circulating system.

The above are generalized concentrations of DIAMOND SEAL absorbent polymer for loss of circulation to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency.

In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

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.

APPLICATION / FUNCTION

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

Rapid reaction upon contact with water. Enables quick response to loss of circulation. Non-fermenting. Temperature tolerant.

RECOMMENDED TREATMENT

As a slug treatment

- Add 5 - 10 gals (20 - 40 L) of vegetable oil directly into drillstring to pre-coat metal surfaces of drillstring
- Follow immediately into drillstring with 1 - 2 buckets of FUSE-IT
- Follow addition of FUSE-IT lost circulation material with 5 - 10 gals (20 - 40 L) of vegetable oil and displace. Following displacement allow 30 - 60 minutes for hydration prior to attempt to regain circulation

As a pill

- Add FUSE-IT lost circulation material to drilling fluid at a concentration of 0.5 - 1.0 % by volume (2 - 4 qts/100 gals or 5 - 10 L/m³) and displace mixture immediately into zone of interest

KWIK-SEAL™ loss of circulation material is an engineered blend of granular, flake and fibrous materials used to minimize loss of whole drilling fluid to the formation. It is available in three grind sizes to function effectively over the widest range of lost circulation conditions.

APPLICATION / FUNCTION

Reduces the loss of whole fluid to formation in water based drilling fluids. Promotes sealing of permeable or fractured zones. Assists in stabilizing loose and unconsolidated formations.

ADVANTAGES

Applicable in wide range of lost circulation environments. Forms a light, strong seal under high and low differential pressures. Resultant seal is not easily removed by bit movement or mud circulation.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
5.0 - 30.0	12.0 - 72.0	15.0 - 85.0

*1 bbl = 42 U.S. gallons

Prior to pumping KWIK-SEAL loss of circulation material be sure to remove all in-line screens in circulating system.

KWIK-SEAL loss of circulation material is comprised of organic based materials and therefore is not recommended to be used in the construction of potable water wells due to the ability of the material to act as a nutrient for bacteria.

The above are generalized concentrations of KWIK-SEAL loss of circulation material to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative

Kwik-Seal® is a registered product of CP Kelco, Inc.

MICA loss of circulation material is a naturally occurring, sized and graded mineral used to combat loss of circulation in a variety of drilling applications. As a result of the flat, sheet-like structure and inert nature of MICA loss of circulation material, it is an effective bridging agent and serves as a viable

option to combat lost circulation conditions. MICA loss of circulation material is available in three grades: Fine, Medium and Coarse.

APPLICATION / FUNCTION

Reduces the loss of whole fluid to formation in water and oil based drilling fluids. Promotes sealing of permeable or fractured zones. Assists in stabilizing loose and unconsolidated formations.

ADVANTAGES

Easy to mix. Stable material not subject to bacterial or temperature degradation. Compatible with other Baroid drilling fluid additives and loss of circulation materials.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
8.5 - 40.0	20.0 - 95.0	25.0 - 115.0

*1 bbl = 42 U.S. gallons

Prior to pumping MICA loss of circulation material be sure to remove all in-line screens in circulating system.

The above are generalized concentrations of MICA loss of circulation material to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency.

In the event that further information is needed please refer to the Product Data Sheet or contact your local Baroid IDP representative.

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.

APPLICATION / FUNCTION

N-SEAL lost circulation material can be used as an additive for loss of circulation in concentrations up to 70 lb/100 gallons (86 kg/m³).

ADVANTAGES

NSF/ANSI Standard 60 certified. Acid soluble. Can be easily wetted. Inorganic and non-fermenting.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
2.0 - 30.0	5.0 - 70.0	6.0 - 84.0

*1 bbl = 42 U.S. gallons

N-SEAL acid soluble loss of circulation material can be added directly through the hopper.

Prior to pumping N-SEAL acid soluble loss of circulation material be sure to remove all in-line screens in circulating system.

The above are generalized concentrations of N-SEAL acid soluble loss of circulation material to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

LUBRICANTS, CUTTING OILS & ROD GREASE

BARO-LUBE GOLD SEAL™ lubricant is a liquid additive specifically formulated for use in industrial drilling applications where environmental constraints preclude the use of hydrocarbon-based additives. BARO-LUBE GOLD SEAL lubricant is designed to reduce friction under extreme pressure (metal-to-metal) and in the borehole (metal-to-formation).

APPLICATION / FUNCTION

Helps reduce drill rod torque and drag. Helps lubricate drill rods and casing in close tolerance boreholes. Helps reduce heat generated at bit face. Helps reduce bit balling and mud rings on rods. Helps minimize potential for differential sticking.

ADVANTAGES

Water soluble lubricant. Mixes in fresh or saltwater-based drilling fluids. Increases lubricating properties of bentonite and polymer based drilling fluid systems. Stable at elevated sub-surface temperatures up to 300°F.

RECOMMENDED TREATMENT

% by Volume	Gallons/100 gals	Liter/m ³
1.0 - 2.0	1.0 - 2.0	10.0 - 20.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of BARO-LUBE GOLD SEAL drilling fluid lubricant for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of BARO-LUBE GOLD SEAL drilling fluid lubricant to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

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

APPLICATION / FUNCTION

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.

RECOMMENDED TREATMENT

As aid in core recovery

- 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.

As a cleaning solution for drill rig components

- Mix one quart of CORE-LUBE lubricant with 50 gals of water or 5 L of CORE-LUBE lubricant per m³ of water.

DD-8 environmentally friendly lubricant and torque reducer is used for water based drilling fluids. DD-8 lubricant reduces friction between the drill rods and casing, and between the drill rods and the formation. DD-8 lubricant is biodegradable and contains no hydrocarbons.

APPLICATION / FUNCTION

Reduces torque and drag. Improves penetration rate. Replaces refined or crude oil where their use is prohibited or improved lubrication is required.

ADVANTAGES

Imparts extreme pressure lubrication to the drilling fluid. Very low concentrations required. Functions in fresh and salty water over wide pH range. Functions in hard water (high calcium/magnesium concentration).

RECOMMENDED TREATMENT

% by Volume	Quarts/100 gals	Liter/m ³
0.25 - 1.0	1.0 - 4.0	2.5 - 10.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of DD-8 torque reducer for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of DD-8 torque reducer to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

DD-8 torque reducer is a regionally sourced product and not commonly available through all Baroid IDP Distributors. Please contact your local Baroid IDP representative to confirm availability within your area of operations.

DINOMUL™ 2 torque reducer is a specially formulated, aqueous solution designed to help provide friction reduction and improve lubrication characteristics of water-based drilling fluids. DINOMUL 2 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.

APPLICATION / FUNCTION

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

Effective torque reduction in a wide-range of geologic conditions. Cost effective at moderate to low concentrations.

RECOMMENDED TREATMENT

% by Volume	Quarts/100 gals	Liters/m ³
0.25 - 2.0	1.0 - 8.0	2.5 - 20.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of DINOMUL 2 torque reducer for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of DINOMUL 2 torque reducer to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

EP MUDLUBE® modified tall oil fatty acid can be used to impart extreme pressure lubricating properties to drilling fluids. EP MUDLUBE lubricant readily adsorbs on exposed surfaces, providing a physical coating that is effective in reducing metal-to-metal friction.

APPLICATION / FUNCTION

Can reduce drill rod torque and drag. Can Lubricate drill rods and casing in close tolerance boreholes. Can reduce heat generated at bit face. Can enhance tolerance of chemical contaminations in drilling fluids.

ADVANTAGES

Effective small concentrations. Help reduce metal-to-metal friction and resultant torque. Compatible with other Baroid drilling fluid additives when added in proper sequence.

RECOMMENDED TREATMENT

% by Volume	Quarts/100 gals	Liters/m ³
0.5 - 2.0	2.0 - 8.0	5.0 - 20.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of EP MUDLUBE extreme pressure lubricant for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of EP MUDLUBE extreme pressure lubricant to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

IDP-214 rod grease is a high quality, easily applied formulation designed to help dampen high frequency vibration created in continuous wire line coring operations due to the absence of active fluid returns or static fluid level within the annular space.

APPLICATION / FUNCTION

Helps reduce drill rod vibration. Helps reduce drill rod torque and drag. Can minimize rod sticking. Can minimize wear on drill string.

ADVANTAGES

Excellent vibration dampening. Good adhesion to metal. Stable at wide range of temperatures. Highly water resistant (provides good corrosion protection). Chemically stable in use and storage.

RECOMMENDED TREATMENT

Apply a uniform amount on the outside of the drill rods as they are tripped into the hole.

Apply only enough IDP-214 rod grease to facilitate uniform coating of the drill rods.

If excessive amounts of IDP-214 are applied to the drill rods it may result in the drill string becoming grease-bound within the borehole.

IDP-479 is a premium quality 320 viscosity hammer oil that is biodegradable.

APPLICATION / FUNCTION

Designed to lubricate the air line in down hole air hammers. Adequate lubricant reduces wear and helps improve equipment life.

ADVANTAGES

Maintains viscosity at elevated temperatures. Effective air line lubricant. Excellent adherence to metal surfaces. Lubricates in extreme pressure.

Biodegradable.

RECOMMENDED TREATMENT

Application	Quarts/hr	Liters/hr
Added to airstream to facilitate lubrication of down hole hammer.	1.6 - 5.8	1.5 - 5.5

IDP- 479 is a regionally sourced product and not commonly available through all Baroid IDP Distributors.

Please contact your local Baroid IDP representative to confirm availability within your area of operations.

IDP-585 lubricant is a proprietary blend of synthetic components formulated to help reduce friction in water-based drilling fluids. IDP-585 lubricant can be used to help minimize friction pressures in the metal-to-metal and metal-to-formation environments found in high angle wells.

APPLICATION / FUNCTION

Reduce drill rod torque and drag. Lubricate drill rods and casing in close tolerance boreholes. Reduce heat generated at bit face. Reduce potential for differential sticking.

ADVANTAGES

Can boost lubricating properties of bentonite or polymer drilling fluid systems. Compatible with most drilling fluid additives. Minimal effect on rheological properties. Stable at elevated sub-surface temperatures.

RECOMMENDED TREATMENT

% by Volume	Quarts/100 gals	Liters/m ³
1.0 - 3.0	4.0 - 12.0	10.0 - 30.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of IDP-585 lubricant for reduction of excess calcium and pH adjustment.

IDP- 585 is a regionally sourced product and not commonly available through all Baroid IDP Distributors. Please contact your local Baroid IDP representative to confirm availability within your area of operations.

The above are generalized concentrations of IDP-585 lubricant to be added to water-based drilling fluids.

The ultimate usage concentration will be based on local geology, application and mixing efficiency.

In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

NXS-LUBE® extreme pressure (EP) lubricant is a proprietary blend of synthetic components specially formulated to help provide friction reduction in water-based fluids. NXS-LUBE extreme pressure lubricant has proven extremely effective in helping to minimize friction pressures in the metal-to-metal and metal-to-formation environments found in high angle wells.

APPLICATION / FUNCTION

Reduce drill rod torque and drag. Lubricate drill rods and casing in close tolerance boreholes. Reduce heat generated at bit face. Enhance tolerance of chemical contaminations in drilling fluids. Minimize potential for differential sticking.

ADVANTAGES

Effective at low concentrations. Can mix in fresh or salty water. Compatible with most drilling fluid additives. Minimal effect on rheological properties.

RECOMMENDED TREATMENT

% by Volume	Quarts/100 gals	Liters/m ³
0.5 - 2.0	2.0 - 8.0	5.0 - 20.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of NXS-LUBE extreme pressure lubricant for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of NXS-LUBE extreme pressure lubricant to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

TR-10 lubricant is a liquid additive specifically formulated to reduce friction in water based drilling fluids.

APPLICATION / FUNCTION

Helps reduce drill rod torque and drag. Helps lubricate drill rods and casing in close tolerance boreholes. Helps reduce heat generated at bit face. Helps reduce bit balling and mud rings on rods. Helps minimize potential for differential sticking.

ADVANTAGES

Water soluble lubricant. Mixes in fresh or saltwater-based drilling fluids. Compatible with most drilling fluid additives. Increases lubricating properties of bentonite and polymer based drilling fluid systems.

RECOMMENDED TREATMENT

% by Volume	Quarts/100 gals	Liters/m ³
1.0 - 2.0	4.0 - 8.0	10.0 - 20.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of TR-10 lubricant for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of TR-10 lubricant to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

TR-10 lubricant is a regionally sourced product and not commonly available through all Baroid IDP Distributors. Please contact your local Baroid IDP representative to confirm availability within your area of operations.

XTRALUBE™ PLUS torque reducer is a high performance lubricant used to reduce rotational torque and drag resulting from borehole deviation and formation interaction in most water-based drilling fluids.

APPLICATION / FUNCTION

Reduce drill rod torque and drag. Lubricate drill rods and casing in close tolerance boreholes. Reduce heat generated at bit face.

ADVANTAGES

Effective in fresh water and brackish water environments. Effective in small concentrations. Compatible in bentonite and polymer based fluid systems. Minimal effect on rheological properties.

RECOMMENDED TREATMENT

% by volume	Quarts/100 gals	Liters/m ³
0.25 - 0.5	1.0 - 4.0	2.5 - 10.0

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water prior to the addition of XTRALUBE PLUS torque reducer for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of XTRALUBE PLUS torque reducer to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

XTRALUBE PLUS torque reducer is a regionally sourced product and not commonly available through all Baroid IDP Distributors. Please contact your local Baroid IDP representative to confirm availability within your area of operations.

THINNERS & DISPERSANTS

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.

APPLICATION / FUNCTION

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. Non-fermenting.

RECOMMENDED TREATMENT

- As a mud thinner: Start by adding one pint of AQUA-CLEAR PFD additive to 500 gals of mud or 250 ml/m³.
- Using borehole diameter and total length of screened interval calculate volume of borehole and then double that volume to determine the minimum volume to treat with AQUA-CLEAR PFD.
- The purpose for doubling the volume is to compensate for the volume of water inside the screen, filter pack and formation interface.
- Once the water volume is determined, calculate the required treatment volume of AQUA-CLEAR PFD additive by the following formula:

$$\text{AQUA-CLEAR PFD (gals or L)} = 0.002 \times \text{Water Volume (gals or L)}$$

*This equates to one gallon of AQUA-CLEAR PFD for every 500 gals of water (0.2% by volume)
or 2.0 L of AQUA-CLEAR PFD for every m³ of water.*

The above are generalized concentrations of AQUA-CLEAR PFD Phosphate-Free Dispersant to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

AQUA-CLEAR® PFD DRY beaded polymeric dispersant is designed to efficiently remove sediment and mud from producing formations and gravel pack without the use of phosphates. AQUA-CLEAR PFD DRY dispersant is also a highly effective mud thinner.

APPLICATION / FUNCTION

Dispersion of mud, sediment and clay from the producing formation and gravel pack in the screened interval. Reduced viscosity and gel strength of drilling fluids.

ADVANTAGES

Phosphate-free. Can reduce development time. Can reduce pumping cost. Can increase well yield and capacity.

RECOMMENDED TREATMENT

- As a mud thinner, 0.5 lbs/500 gals (0.12 kg/m³) of drilling fluid
- As a well development chemical, 5.5 lbs/500 gals (1.31 kg/m³) of well development water

BARAFOS® non-glassy, modified polyphosphate is used as a thinner and dispersant in water-based drilling fluids and as an aid in water well development.

APPLICATION / FUNCTION

Disperse clay and sediment for removal during well development. Disperse reactive clays that cause mud rings and bit balling.

ADVANTAGES

Dissolves and will not re-crystallize in cold water. Lower pH than commonly available glassy polyphosphates. Inorganic compound.

RECOMMENDED TREATMENT

To aid in water well development

- Determine volume of water in screen area and double the calculated volume to account for water in gravel pack and formation interface.
- Completely dissolve 10 - 20 lbs BARAFOS dispersant into 100 gals water (12 - 24 kg/m³). Jet and surge this solution through the screen and gravel pack during well development. Repeat as necessary.

DO NOT add dry BARAFOS dispersant directly into the screen or gravel pack

To thin the drilling mud

- Add 0.5 - 1 lb BARAFOS dispersant per 100 gals of drilling fluid (0.6 - 1.2 kg/m³) slowly at the flow line. For best results, dissolve BARAFOS dispersant in a small quantity of water before adding.
- Product addition becomes less effective if mud weight exceeds 10 lbs/gal (1.2 sg).

SAPP (Sodium Acid Pyrophosphate) inorganic thinner, is a commercial chemical used as a thinner and dispersant in freshwater drilling fluids and as an aid in water well development.

APPLICATION / FUNCTION

Reduction of viscosity and gel strengths in freshwater drilling fluids. Effective dispersion of reactive clays. Dispersion of clay particles and sediments so they can be removed during well development. Effective chemical treatment for cement contaminated fluids.

ADVANTAGES

Facilitates removal of calcium and reduces pH in cement contaminated fluids. Fast acting and effective at low concentrations.

RECOMMENDED TREATMENT

To aid in water well development

- Completely dissolve 10 - 20 lbs of SAPP dispersant per 100 gals water or 12 - 24 kg/m³ of water. Jet and surge this solution through the screen and gravel pack during well development. Repeat as necessary.

For thinning of drilling fluid

- Add 0.25 - 0.5 lbs of SAPP inorganic thinner per 100 gals (0.3 - 0.6 kg/m³) of drilling fluid.

SPECIALTY PRODUCTS & CHEMICALS

AQUA-CLEAR® AE liquid blend of acids and acid enhancers is formulated to control bacterial slime contamination due to the presence of iron-related and sulphate-reducing bacteria.

APPLICATION / FUNCTION

Remove the bio-mass matrix caused by bacterial fouling. Reduce sulphur taste and odor in water. Clean up well screens, pumps and distribution system. Restore well productivity and reduce power and maintenance costs.

ADVANTAGES

NSF/ANSI Standard 60 certified. Safe to use on all plastics, rubber and metals. Cost effective, efficient extended life treatment. Improves water quality and renews well production rate. Mitigates corrosion and equipment failure.

RECOMMENDED TREATMENT

- Record initial well water pH.
- The preferred application method is to apply a solution of AQUA-CLEAR AE into the screened interval through a tremie pipe.
- Mix AQUA-CLEAR AE with water at 6 - 12 oz/gal of water or 47 - 94 ml/L of water and apply directly into screened interval with a tremie pipe. When utilizing this method, calculate the volume of water in the screened area and double the calculated volume to account for the water in the gravel pack and formation interface.

Caution: Never mix chlorine and AQUA-CLEAR AE liquid blend in well.

The above are generalized concentrations of AQUA-CLEAR AE acid enhancer to be added to water for well rehabilitation. The ultimate usage concentration will be based on well condition, product application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

AQUA-CLEAR® MGA dry blend of granular acid and additives is used in the removal of iron, manganese and carbonate scale. It retains strength longer than most liquid acids, which increases its cleaning capability.

APPLICATION / FUNCTION

Disperse scale and incrustation. Remove scale and incrustation from the water well screen, casing, gravel pack and pumping equipment. Restore well production.

ADVANTAGES

NSF/ANSI Standard 60 certified. Safe to use on all plastics, rubber and metals. No harmful vapors. Improves water quality (color, taste and appearance). Reduces equipment and piping failures due to scale build-up and corrosion.

RECOMMENDED TREATMENT

- Record initial well water pH.
- The preferred application method is to apply a solution of AQUA-CLEAR MGA additive into the screened interval through a tremie pipe.
- Mix AQUA-CLEAR MGA with water at $\frac{1}{2}$ - 1 lb/gal of water or 0.06 - 0.12 kg/L of water and apply directly into screened interval with a tremie pipe. When utilizing this method, calculate the volume of water in the screened area and double the calculated volume to account for the water in the gravel pack and formation interface.

Caution: Never mix chlorine and AQUA-CLEAR MGA additive in well.

The above are generalized concentrations of AQUA-CLEAR MGA dry granular acid to be added to water for well rehabilitation. The ultimate usage concentration will be based on well condition, product application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

BARAD-658™ cement additive is a dry, free-flowing powder designed to reduce the filtration rate and retard the set of Portland Cement slurries used in water well, minerals exploration and construction applications. When used in conjunction with Portland Cement at the recommended concentration, BARAD-658 cement additive creates a slurry with enhanced flow properties and improved bonding characteristics.

APPLICATION / FUNCTION

Reduction of filtration rates in Portland Cement slurries. Delayed set of Portland Cement slurries.

ADVANTAGES

NSF/ANSI Standard 60 certified. No additional water requirement for additive. Can enhance hydraulic bonding characteristics of cement.

RECOMMENDED TREATMENT

Added to make-up water for cement (preferred method)

- Required concentration: add 2 lbs (0.91 kg) of BARAD-658 cement additive for every 94 lbs (42.64 kg) of Portland Cement, or add at BARAD-658 at 2.12% by weight of cement (BWOC)
- Add BARAD-658 cement additive to the appropriate volume of make-up water and mix at high shear for 2 - 3 minutes prior to addition of Portland Cement
- Add Portland Cement to BARAD-658 additive/water mixture and mix at high shear to ensure efficient wetting of cement solids
- Pump BARAD-658 additive/cement mixture into annular space or borehole

The above are generalized concentrations of BARAD-658 cement additive for augmentation of Portland cement.

The ultimate product performance will be based on proper formulation, mixing efficiency and effective displacement.

In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

BARAD-399 CORE™ single sack drilling fluid system is engineered to address the majority of drilling situations in wireline coring operations. The BARAD-399 CORE system provides easy mixing, rapid hydration characteristics and yields a drilling fluid formulation with ideal viscosity, excellent filtration control/lubricity and enhanced bore hole stabilization.

APPLICATION / FUNCTION

Formation of a low-solids, freshwater drilling fluid engineered for wireline coring applications. Clay/shale stabilization limiting swelling and/or dispersion. Filtration control in porous formations. Borehole stability in water sensitive formations.

ADVANTAGES

Reduces variation in formulation from shift to shift. Reduces number of products on site. No additives necessary. Optimized grind size for enhanced mixing and yield. Efficiently improves filtration control. Provides lubricity.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
7.0 - 10.5	17.0 - 25.0	20.0 - 30.0

*1 bbl = 42 U.S. gallons

It is recommended that Soda Ash (sodium carbonate) be added to the make-up water (saline or freshwater) prior to the addition of BARAD-399 CORE single sack drilling fluid system for reduction of excess calcium and pH adjustment.

The above are generalized concentrations of BARAD-399 CORE single sack drilling fluid system to be added to water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

BARA-DEFOAM[®] 500 defoamer is designed for topical application to break down foam associated with air/foam drilling operations. BARA-DEFOAM 500 defoamer can be used to defoam most water-based drilling fluids.

APPLICATION / FUNCTION

Enhanced breakdown of surface foam for air/foam drilling systems. Reduced surface foam in water-based drilling fluids. Minimized air entrainment in water-based drilling fluids.

ADVANTAGES

Easy to use, readily dispersible in water. Effective in low concentrations. Non-silicone defoamer.

RECOMMENDED TREATMENT

Breakdown of surface foam for air/foam drilling

- Mix BARA-DEFOAM 500 defoamer with water into a pump sprayer at a ratio of 8 - 32 fl oz/gal of water (62.5 - 250 ml/L of water). Apply mixture with pump sprayer in mist form to the surface of the generated foam.
- For larger scale air foam or stiff foam operations where larger volumes are required, mix BARA-DEFOAM 500 defoamer at 6.25 - 25% by volume with fresh water and apply topically to manage produced foam.

Reduction of foaming in water-based drilling fluids

- Add BARA-DEFOAM 500 defoamer directly into the affected fluid at a concentration of 0.5 - 1.0 pints/100 gals (0.6 - 1.25 L/m³) of drilling fluid.

The above are generalized concentrations of BARA-DEFOAM 500 defoamer to be added to water based drilling fluids or foam produced from air/foam drilling. The ultimate usage concentration will be based on the nature of the system the product is applied to, method of application and efficiency of treatment. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

BAROID® 41 weighting material is a specially processed barite in powder form for use as a drilling fluid weighting additive. BAROID 41 weighting material has a specific gravity of 4.1 and can be used to increase the density of drilling fluids up to 21 lb/gal (2.40 sg).

APPLICATION / FUNCTION

Helps increase drilling fluid density up to 21 lbs/gal (2.4 sg). Helps control formation pressures. Helps stabilize the borehole.

ADVANTAGES

High quality, free from corrosive and abrasive material. Chemically inert. Cost-effective weighting agent.

RECOMMENDED TREATMENT

- Before adding BAROID 41 weighting material, the Marsh Funnel viscosity (sec/qt) of the circulating fluid should be increased to four times the desired final weight by the addition of AQUAGEL® or QUIK-GEL® additives
- Add BAROID 41 material through a high shear mixer so the entire circulating volume is at uniform weight
- To control an artesian flow at the surface, premix the necessary volume of weighted mud and apply in one continuous operation

NOTE: In near surface holes drilled in unconsolidated alluvium (overburden), weights in excess of 11 lbs/gal (1.32 sg) could result in loss of circulation

The above are generalized concentrations of BAROID 41 weighting material to be added to fresh-water based drilling fluids.

The ultimate usage concentration will be based on subsurface pressures encountered, application and mixing efficiency.

In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

LUBRA-BEADS® spherical bead lubricant is comprised of copolymer beads and are available in two sizes – Coarse and Fine. LUBRA-BEADS spherical bead lubricant functions similar to tiny ball bearings that will not break under extreme stress and impact.

APPLICATION / FUNCTION

Helps provide lubrication in water-based and oil-based systems. Helps reduce torque and drag. Helps reduce jacking forces in microtunnelling operations. Helps provide lubrication in deviated wellbores.

ADVANTAGES

Effective in fresh water, salt water and brine-based fluids. Insoluble in water. Stable at temperatures up to 400°F (205°C).

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
1.0 - 7.0	2.4 - 17.0	3.0 - 20.0

*1 bbl = 42 U.S. gallons

LUBRA-BEADS spherical bead lubricant will be removed from a re-circulated mud system by the solids control equipment. Allowable concentration levels may vary with drilling discipline and/or application used. As the product is a physical bead, all inline screens, ports and orifices should be evaluated to ensure material may physically pass through without creating restriction.

The above are generalized concentrations of LUBRA-BEADS spherical bead lubricant to be added to fresh or salt water-based drilling fluids. The ultimate usage concentration will be based on local geology, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

PLUG FOAM A & B are two liquid components which comprise a rigid foam system. PLUG FOAM A is designed to be mixed with PLUG FOAM B to create a quick setting and stable chemical foam.

APPLICATION / FUNCTION

Forms a rigid urethane foam that can be used for sealing annular space, loss circulation zones and around conductor pipe.

ADVANTAGES

Quick setting. Cost effective. Exhibits adhesive properties. Rigid set. Low permeability.

RECOMMENDED TREATMENT

The PLUG FOAM A & B rigid foam system is created by combining components into a suitable mixing container in the ratio of one can of part A to one can of part B

- Stir mixture thoroughly for 5 - 10 seconds, then place into annular space
- The yield and density of the foam mix will depend on temperature, geometry of the space to be filled and distribution of the foam mix
- Attention to safe handling and use of the product is strongly recommended
- Do not place the foam mix in a closed cavity or container, as the foam rapidly expands and will build pressure and temperature

PLUG FOAM A & B are designed for Industrial use only

Soda Ash is a white, granular powder primarily used to condition and soften make-up water and raise pH.

APPLICATION / FUNCTION

Treat out hardness due to calcium in make-up water. Raise pH.

ADVANTAGES

Eliminate calcium ions by removing them as insoluble calcium carbonate. Maximize the performance of bentonite and polymer product.

RECOMMENDED TREATMENT

lbs/bbl*	lbs/100 gals	kg/m ³
0.2 - 0.85	0.5 - 2.0	0.6 - 2.4

*1 bbl = 42 U.S. gallons

- Hardness and pH levels of make-up water should be checked prior to addition of Soda Ash
- Addition of Soda Ash should always be done prior to addition of bentonite or polymer to the fluid system
- Soda Ash should not be added at the same time as other drilling fluid components
- When treating make-up water pH ranges should be maintained between 8.5 - 9.5

The above are generalized concentrations of Soda Ash sodium carbonate to be added to fresh or salt water-based drilling fluids. The ultimate usage concentration will be based on local geology, water chemistry, application and mixing efficiency. In the event that further information is needed, please refer to the Product Data Sheet or contact your local Baroid IDP representative.

SYSTEM FLOC-360™ polymeric flocculant is used to flocculate clays and shales encountered in drilling operations and facilitate recycling and/or disposal of water-based drilling fluids.

APPLICATION / FUNCTION

Promotes flocculation and settling of dispersed formation solids in clear fluids and conventional drilling fluids.

ADVANTAGES

Can create aggressive water/solids separation. Can improve clarity of residual fluids after treatment. Effective in low to moderate concentrations.

RECOMMENDED TREATMENT

Contact your local Baroid IDP representative for optimization of product use.

SOFCHEK® HARDNESS TEST STRIPS

Total Hardness is measured in the range of 0 - 425 parts/million (0 to 25 grains/gal). SofChek® Water Hardness Test Strips are packaged 50 to a bottle for professionals requiring a quick, reliable method of on-site testing. SofChek Test Strips also come individually packaged in cases of 250 and 1000. SofChek Total Hardness Test Strips can reduce time spent testing in the field.

FILTER PRESS API (LPLT)

Filtration and wall-building properties of drilling fluids and cement slurries are determined by a filter press. The filtration rate is a measure of fluid loss measured in milliliters (ml) [1 ml = 1 cm³] under 100 psi (690 kPa) of pressure through a special filter paper for 30 minutes. Wall-building characteristics are demonstrated by the thickness and consistency of the filter cake (the residue) deposited on the filter paper at the end of this period. The filter cake is measured to the closest 1/32" (0.8 mm).

MODEL 140 MUD BALANCE

The Model 140 Mud Balance provides a simple, practical method for accurate determination of fluid density. It is one of the most sensitive and accurate field instruments available for determining the density or weight-per-unit-volume (specific gravity) of drilling fluids. An outstanding advantage of this Mud Balance is that the temperature of the sample does not materially affect the accuracy of readings. A high impact plastic case protects the balance during transport and provides a secure base in its working position.

MARSH FUNNEL VISCOMETER

The Marsh Funnel Viscometer Model 201 and Measuring Cup Model 202 are made of rugged, break-resistant plastic that resists temperature change deformation. The Measuring Cup, graduated in cubic centimeters and fluid ounces, is designed specifically for use with the Marsh Funnel. This easy to operate equipment is used for making rapid, on the spot measurements of fluids viscosity. The Marsh Funnel readings are only general measurements, but the frequent reporting of the Marsh Funnel Viscosity will indicate changes in the fluid viscosity that could require corrective action.

pH STRIPS

Drilling fluid pH measures whether the fluid is basic or acidic. Using pH strips allows for a quick, reliable method for onsite testing in the range of 0 - 14 pH. pH strips come individually packaged in cases of 100, and allow for determining pH to the nearest 0.5 pH by matching the four colors on the strip to the chart on the package.

SAND CONTENT TEST KIT

Sieve analysis is the preferred method for sand content determination because of the reliability of the test and simplicity of equipment. The volume of sand, including that of void spaces between grains, is usually measured and expressed as a percentage by volume of the drilling fluid. The kit consists of a special 200 mesh sieve 2½ inches in diameter, fastened inside a collar upon which a small funnel is fitted on either end. This is used with a 10 ml glass measuring tube, graduated to read from 0 to 20% the percentage sand by volume. The collar and funnel are made of polyethylene and the screen is made of brass. A 500 ml wash bottle and carrying case are included.

ROUND TANK, Gals/Inch of Height

$$0.003402 \times (\text{Diameter (in)})^2$$

RECTANGULAR TANK, Gallons/Inch of Height

$$\text{Length (ft)} \times \text{Width (ft)} \times 0.6234$$

ROD CONTENT, Gallons/100 feet

$$4.081 \times (\text{Inside Diameter (in)})^2$$

ROD DISPLACEMENT, Gallons/100 feet

$$[4.081 \times (\text{Outside Diameter (in)})^2] - \text{Rod Content}$$

ROUND TANK, Liters

$0.7854 \times (\text{Diameter (m)})^2 \times \text{Height (m)} \times 1000$

RECTANGULAR TANK, Liters

$\text{Length (m)} \times \text{Width (m)} \times \text{Height (m)} \times 1000$

ROD CONTENT, Liters

$0.0007854 \times (\text{Inside Diameter (mm)})^2 \times \text{Length of rods in the hole (m)}$

ROD DISPLACEMENT, Liters

$[0.0007854 \times (\text{Outside Diameter (mm)})^2 \times \text{Length of rods in the hole (m)}] - \text{Rod Content}$

STANDARD CALCULATIONS

120

Note: Dh = Diameter of hole, inches dp = diameter of pipe, inches

ANNULAR VOLUME, Gallons

$$\left(\frac{Dh^2 - dp^2}{24.52} \right) \times \text{Depth (ft)}$$

HOLE VOLUME/PIPE CAPACITY, Gallons

$$\left(\frac{Dh^2}{24.52} \right) \times \text{Depth (ft)}$$

ANNULAR VELOCITY (AIR), Feet/Minute

$$\text{Cfm} \times \left(\frac{183.4}{Dh^2 - dp^2} \right)$$

ANNULAR VELOCITY (FLUID), Feet/Minute

$$\text{Pump Output (gal/min)} \times \left(\frac{24.52}{Dh^2 - dp^2} \right)$$

HYDROSTATIC PRESSURE, Pounds/Inch²

$$0.052 \times \text{Mud Weight (lbs/gal)} \times \text{Depth (ft)}$$

Note: D_h = Diameter of hole, millimeters d_p = diameter of pipe, millimeters

ANNULAR VOLUME, Liter/Meter

$$\left(\frac{D_h^2 - d_p^2}{1273} \right) \times \text{Depth (m)}$$

HOLE VOLUME/PIPE CAPACITY, Liter/Meter

$$\left(\frac{D_h^2}{1273} \right) \times \text{Depth (m)}$$

ANNULAR VELOCITY (AIR), Meters/Minute

$$\text{m}^3/\text{min} \times \left(\frac{1273000}{D_h^2 - d_p^2} \right)$$

ANNULAR VELOCITY (FLUID), Meters/Minute

$$\text{Pump Output (L/min)} \times \left(\frac{1273}{D_h^2 - d_p^2} \right)$$

HYDROSTATIC PRESSURE, kPa

$$0.00981 \times \text{Mud Weight (kg/m}^3) \times \text{Depth (m)}$$

$$\text{Lbs. of Barite Required (B)} = \left[\frac{35.05 \times (W_f - W_i)}{35.05 - W_f} \right] \times V_i$$

WHERE:

- B = Amount of Barite to add, lbs
- V_i = Starting volume of mud, gals
- W_f = Desired Mud Weight, lb/gal
- W_i = Starting Mud Weight, lb/gal

RULE OF THUMB:

For Weighted Drilling Fluids up to 12 lbs/gal using Barite

For every 140 lbs of Barite added to 100 gals (U.S.) the weight will rise 1lb/gal

Prior to weighting up fluid the Funnel Viscosity must be raised with AQUAGEL® or QUIK-GEL® viscosifier to four times the final mud weight

WEIGHT-UP CALCULATION WITH BARITE, Metric

123

$$\text{Barite Required (B)} = \left[\frac{4.2 \times (W_f - W_i)}{4.2 - W_f} \right] \times V_i$$

WHERE:

- B = Amount of Barite to add, kg
- V_i = Starting Volume of mud, L
- W_f = Desired Mud Weight, sg
- W_i = Starting Mud Weight, sg

RULE OF THUMB:

- For Weighted Drilling Fluids up to 1.44 sg using Barite
- For every 168 kg/m³ the weight will rise 0.12 sg

CONVERSION TABLE

	Standard	Multiply by	Metric
Depth	Feet	0.3048	Meter
Volume	Gallons	0.003785	Cubic Meters
Pressure	Pounds/square inch	6.895	Kilopascals
Flow Rate	Gallons/minute	3.785	Liters/minute
Additive Concentration	Pounds/100 gallons	1.1983	Kilograms/cubic meter
Mud Weight	Pounds/gallon	0.12	Specific Gravity
Cake Thickness	32 nd of an inch	0.794	Millimeters
Rate of Penetration	Feet/hour	0.3048	Meters/hour
Weight on Bit	Thousands of pounds	0.4536	Tonnes
Pressure Gradient	Pounds/square inch/foot of depth	22.62	Kilopascals/meter
Casing Weight/Length	Pounds/foot	1.488	Kilograms/meter

WIRELINE DRILL RODS Q WIRELINE DRILL RODS

Size	OD (mm)	ID (mm)	Weight (kg/m ³)	Threads/in	Content (L/100 m)
AQ	44.5	34.9	14.0	4.00	95.8
BQ	55.6	46.0	18.0	3.00	166.3
NQ	69.9	60.3	23.4	3.00	285.8
HQ	88.9	77.8	34.4	3.00	474.4
PQ	117.5*	103.2	47.2**	3.00	836.6

*Coupling OD

**With Coupling PQ Rod Body OD = 114.3

WIRELINE DRILL RODS Q WIRELINE DRILL RODS

Size	OD (in)	ID (in)	Weight (1lb/10ft)	Threads/in	Content (gal/100ft)
AQ	1.75	1.375	31	4.00	7.7
BQ	2.1875	1.8125	40	3.00	13.4
NQ	2.75	2.375	52	3.00	23.0
HQ	3.5	3.0625	77	3.00	38.2
PQ	4.625*	4.0625	106**	3.00	67.4

*Coupling OD

**With Coupling PQ Rod Body OD = 4 ½ inches

ANNULAR VELOCITY - TABLE FOR WATER WELL APPLICATIONS

		Hole Size 17.5 in	Pipe Size 4.5 in	Hole Size 12.25 in	Pipe Size 4.5 in	Hole Size 8.5 in	Pipe Size 4.5 in	Hole Size 7.5 in	Pipe Size 4.5 in	Hole Size 6 in	Pipe Size 3.5 in	Hole Size 5 in	Pipe Size 3.5 in
Flow Rate		Annular Velocity		Annular Velocity		Annular Velocity		Annular Velocity		Annular Velocity		Annular Velocity	
US GPM	L/Min	Ft/Min	M/Min	Ft/Min	M/Min	Ft/Min	M/Min	Ft/Min	M/Min	Ft/Min	M/Min	Ft/Min	M/Min
50.0	189.0	4.0	1.3	9.0	2.9	24.0	7.2	34.0	10.4	52.0	15.7	96.0	29.3
75.0	284.0	6.0	2.0	14.0	4.3	35.0	10.8	51.0	15.5	77.0	23.6	144.0	43.9
100.0	379.0	9.0	2.6	19.0	5.7	47.0	14.3	68.0	20.7	103.0	31.4	192.0	58.5
125.0	473.0	11.0	3.3	24.0	7.2	59.0	17.9	85.0	25.9	129.0	39.3	240.0	73.1
150.0	568.0	13.0	3.9	28.0	8.6	71.0	21.5	102.0	31.1	155.0	47.1	288.0	87.8
200.0	757.0	17.0	5.2	38.0	11.5	94.0	28.7	136.0	41.5	206.0	62.8		
225.0	852.0	19.0	5.9	42.0	12.9	106.0	32.3	153.0	46.6	232.0	70.7		
250.0	945.0	21.0	6.5	47.0	14.4	118.0	35.9	170.0	51.8	258.0	78.5		
275.0	1041.0	24.0	7.2	52.0	15.8	129.0	39.5	187.0	57.0	283.0	86.4		
300.0	1130.0	26.0	7.8	57.0	17.2	141.0	43.0	204.0	62.2				
400.0	1514.0	34.0	10.4	75.0	23.0	188.0	57.4	272.0	82.9				

TABLE FOR WATER WELL APPLICATIONS, continued

		<i>Hole Size</i> 17.5 in	<i>Pipe Size</i> 4.5 in	<i>Hole Size</i> 12.25 in	<i>Pipe Size</i> 4.5 in	<i>Hole Size</i> 8.5 in	<i>Pipe Size</i> 4.5 in
Flow Rate		Annular Velocity		Annular Velocity		Annular Velocity	
US GPM	L/Min	Ft/Min	M/Min	Ft/Min	M/Min	Ft/Min	Mtr/Min
500.0	1893.0	43.0	13.0	94.0	28.7	235.0	71.7
600.0	2271.0	51.0	15.7	113.0	34.5	282.0	86.1
700.0	2650.0	60.0	18.3	132.0	40.2		
800.0	3028.0	68.0	20.9	151.0	46.0		
900.0	3407.0	77.0	23.5	170.0	51.7		
1,000.0	3785.0	86.0	26.1	189.0	57.5		
1,100.0	4164.0	94.0	28.7	207.0	63.2		
1,200.0	4542.0	103.0	31.3	226.0	69.0		
1,300.0	4921.0	111.0	33.9	245.0	74.7		
1,400.0	5299.0	120.0	36.5	264.0	80.5		



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