ULTRADRIL

The standard for high performance, ultra-inhibitive water-base drilling fluids
Combine highly reactive shales with sensitive ecosystems and you get a double whammy that can cut deeply into any drilling budget and pose a dilemma for cost-conscious operators. On the one hand, extremely reactive formations, such as those encountered in deepwater, call for the superb inhibitive characteristics of an invert emulsion drilling fluid. On the other, tough environmental restrictions and exorbitant waste management costs make that option much less attractive.

The ULTRADRIL™ high-performance, water-base drilling fluid from M-I SWACO, a Schlumberger company, incorporates a proprietary blend of specially engineered components that collectively deliver a triple-inhibition mechanism that focuses on inhibiting reactive clays, encapsulating cuttings, and preventing accretion and bit balling.
Threefold-inhibition unites drilling efficiency with environmental and economic superiority

Features
- Proprietary inhibition and encapsulating agents
- Triple inhibition methodology
- Specially formulated anti-accretion agent
- Ultra-low toxicity levels
- Near OBM and SBM performance characteristics
- High degree of chemical stabilization
- Formulation, maintenance simplicity

Benefits
- Delivers excellent inhibition
- Provides high drilling rates
- Promotes superb hole cleaning
- Meets all environment standards
- Lowers drilling waste management costs
- Maintains wellbore stability
- Minimizes dilution requirements
- Reduces drilling costs
- Elevates HSE profile

With the ULTRADRIL high-performance water-base drilling fluid, operators no longer have to compromise performance to meet environmental and economic objectives. In some of the most challenging offshore and onshore applications, ULTRADRIL consistently delivers performance characteristics that closely mimic those of premium oil- and synthetic-based drilling fluids.

ULTRADRIL is uniquely formulated with specially blended agents that deliver a triple-inhibition approach that inhibits the most reactive shales and consistently maintains a stable wellbore. It does so while exhibiting high drilling rates, superb hole cleaning and dramatic reductions in clay/gumbo accretion and bit balling.

Of course, with ULTRADRIL you also enjoy the intrinsic environmental benefits of a water-base drilling fluid – ultra-low toxicity, less dilution, reduced waste volume and excellent recyclability.

You can use ULTRADRIL in virtually any offshore or onshore well anywhere in the world with no concern over its environmental acceptability.

But, don’t take our word for it. A growing number of operators across the globe continually give ULTRADRIL the highest marks for routinely delivering operational efficiencies that reduce precious rig time while slashing the volume and associated costs of the drilling-generated waste stream. In fact, ULTRADRIL performance is so close to that of invert emulsion fluids that more field reports reveal that operators are employing much of the same fast-paced drilling practices otherwise reserved for an oil- or synthetic-based system.
The unique three-pronged inhibition approach we designed into ULTRADRIL ensures that it will, without fail, produce a high level of inhibitive behavior that no conventional water-base drilling fluid can approach.

**Inhibition action #1:**
**Superior clay inhibition**
Since typical water-base drilling fluids do not possess the highly inhibitive quality of ULTRADRIL, shales tend to slough and swell, which all too often results in stuck pipe and washouts. A predominant feature of the ULTRADRIL system’s triple-inhibition approach is its ability to inhibit the most reactive shales and provide superb wellbore stability.

**Inhibition action #2:**
**Cuttings encapsulation**
Drilling is comparatively slower with conventional water-base drilling fluids systems, which generate smaller cuttings and lack the inhibitive capacity we designed into ULTRADRIL. In typical water-base systems, cuttings are prone to break apart and disperse, creating fines that not only require high dilution rates, but also settle in the hole, where they can pack-off the bit. At the same time, other particulates swell and agglomerate into large masses that adhere to the bit, drill pipe and BHA. ULTRADRIL puts those concerns to rest by encapsulating cuttings with a thin polymer coating that virtually eliminates shale dispersion. This film, in turn, reduces the need for dilution and the disposal of large fluid volumes. What’s more, since it is a high performance system, ULTRADRIL allows the well to be drilled at higher ROP, producing larger and higher integrity cuttings that come over the shaker firm and intact.

**Inhibition action #3:**
**Protected metal surfaces**
Conventional water-base muds also allow gumbo to build-up and cause bit balling, which slows the drilling process considerably. Another prime element of the ULTRADRIL triple-inhibition approach is its ability to coat the bit, BHA and drill pipe with an accretion-inhibitive coating. Obviously, reducing bit balling keeps the cutting structure clean and effective, resulting in higher ROP.

Triple inhibition your key to faster drilling, enhanced waste management
Three additives specially designed for the ultimate in water-base inhibition.
In developing ULTRADRIL, we also formulated three primary components designed specifically to impart the triple-inhibition of high-performance water-base drilling fluid: ULTRAHIB†, ULTRACAP† and ULTRAFREE†.

ULTRAHIB is a polyamine specially formulated to inhibit the swelling and migrating of clays by reducing their tendency to bond with water within an aqueous environment. It can be added directly to the system, with no adverse effects on viscosity or filtration properties. ULTRAHIB works by chemically bonding to the reactive sites within the clay structures and then drawing them tightly together so that water molecules cannot penetrate the spaces between the clay particles.

ULTRACAP is the encapsulating polymer designed for ULTRADRIL and effectively eliminates shale dispersion and the resulting need for dilution. ULTRACAP limits water penetration into clays and builds a polymeric bridge between clay particles that locks them firmly in place. The ULTRACAP encapsulator controls clay swelling and dispersion with minimal effects on the system’s rheological properties. And, since it is cationic, ULTRACAP acts on more of the clay surface area than anionic additives.

ULTRAFREE is a specially engineered accretion inhibitor that heads off costly gumbo buildup on bits, BHAs, drill pipe and casing. The offshoot of a special blend of surfactants and lubricants, ULTRAFREE coats cuttings and metal surfaces, effectively reducing the sticking tendencies of hydrated solids. ULTRAFREE inhibitor also prevents cuttings accumulation below the bit, minimizing instances of bit balling and generating higher ROP.

For all of the capabilities it gives you, the ULTRADRIL high-performance drilling fluid is surprisingly easy to build and maintain on location. The base fluid can include the full gamut from freshwater to potassium chloride, sodium chloride and, in some instances, seawater.

ULTRADRIL is extremely clean and uses zero bentonite in its makeup. Its inhibitive character means a very low colloidal content. Its properties can be easily maintained, even in the presence of contaminants such as cement and common drilling-fluid additives. And, ULTRADRIL provides its high degree of inhibition without requiring the addition of performance-limiting calcium chloride and other salts.

To ensure top performance, ULTRADRIL can easily be tested in the field to ensure proper concentrations, using simple, common tests such as pH titration, ammonia extraction and retort analysis to confirm product-volume percentage.
As reflected in reports that seem to come in daily from around the world, ULTRADRIL continues to raise the bar when it comes to helping operators enhance their HSE profile, reduce drilling waste, and provide overall environmental benefits. The highly inhibitive chemistry of ULTRADRIL results in dilution rates that are much lower than other water-base drilling fluids. ULTRADRIL consistently produces a smaller waste stream, largely because of the capacity to recycle the spent fluid. As a water-base system, ULTRADRIL also requires less equipment and manpower and does not need all the secondary processing common to invert emulsion drilling fluid systems. ULTRADRIL can be safely discharged both offshore and onshore, making it an even more economical alternative to premium synthetic systems for deep and ultra-deepwater wells and even more so when lost circulation is a very strong possibility.

Proven results comparable to oil-base fluids

Comparative Inhibition: GOM Shales
The impressive inhibitive capability of ULTRADRIL surpasses that of a conventional water-base fluid and closely matches that of a synthetic-based drilling fluid. The system’s low moisture content results in drier, firmer drilled cuttings. With densities up to 11.3 lb/gal (1.3 sg), ULTRADRIL has successfully drilled long sections of highly reactive gumbo shales and graded out very high in terms of stability, inhibition, screenability and maintenance. In sections typically drilled with CaCl₂ or 20% NaCl/PHPA water-base systems, ULTRADRIL eliminated the screen binding, rapid encapsulator depletion and high-dilution rates that had severely impacted wells drilled with its more traditional counterparts.

Reactive-Clay Hydration
Results of a 16-hr test of various drilling fluids on reactive clay samples show three separate ULTRADRIL formulations producing lower clay hydration than that of conventional water-base drilling fluids. Through highly reactive intervals, ROPs have averaged up to 150 ft/hr (45.7 m/hr), delivering cuttings that exhibited the excellent integrity usually expected only when drilling with an oil-base system.

Put ULTRADRIL to work for you
To find out more about how ULTRADRIL is working for our other customers worldwide, contact your local M-I SWACO representative.
Offshore Abu Dhabi: ULTRADRIL with POROSEAL™ handles troublesome shale

The Situation
Offset wells in this area typically utilized a PHPA/Polymer fluid system for drilling the troublesome 8 ½-in. Nahr Umr shale section. However, during logging the interval was often found to be over-gauged. Further, while issues related to the Nahr Umr intervals required a high performance water-base mud (HPWBM), previous attempts with such a system resulted in severe wellbore instability problems.

The Solution
M-I SWACO introduced its ULTRADRIL HPWBM incorporating the unique POROSEAL filtration control and shale sealing additive and ULTRAHIB shale stabilizer to ensure shale stability and improve cementing operations by reducing the instances of over-gauge hole. Project-specific laboratory evaluations showed the HPWBM, which had been proven in other offshore applications in Abu Dhabi, as being an ideal candidate for addressing the Nahr Umr challenges and reducing the drilling days and non-productive time (NPT) encountered in offsets.

The Results
The 8 ½-in. interval was drilled and the 7-in. liner successfully run to bottom without any drilling fluid-related NPT and eliminated the need to backream certain intervals. The ULTRADRIL with POROSEAL eliminated the stuck pipe and bit balling encountered in earlier wells, as well as the reducing the previously recorded drag readings.

Vietnam: ULTRADRIL ideal choice for deepwater exploratory wells

The Situation
An international operator needed a high performance water-base drilling fluid with gas hydrate suppression to drill two deepwater exploration wells. The wells were to be drilled in water depths up to 2,230 ft (680 m), requiring a fluid system capable of inhibiting hydrates in an exploration environment expected to encounter up to 1300 psi hydrostatic pressure and seabed temperature of 42°F (5.4°C).

The Solution
With the ULTRADRIL high performance water-base drilling fluid was seen as a possible solution, M-I SWACO conducted a series of formulation and shale inhibition tests, including gas hydrate modeling, at its Asia Pacific Technical Service Center in Jakarta, Indonesia. Based on the results of the inhibition lab tests and gas hydrate modeling, the ULTRADRIL system was formulated with the addition of 10% v/v Monoethylene Glycol (MEG) and 20%/wt NaCl salt. Prior to final approval of the drilling fluid proposal, technical and operational discussions were carried out with key personnel.

The Results
The performance of the ULTRADRIL system exceeded expectations with the wells drilled trouble free with no drilling fluid-related logging issues. The generated drill cuttings were well-preserved, resulting in smooth screening and superb solids control.