DRILLING SERVICES

DRILLING FLUIDS AND DRILLING-WASTE MANAGEMENT

Maximizing drilling performance and minimizing environmental impact

Weatherford®

DRILL FASTER WITH A **MINIMAL FOOTPRINT**

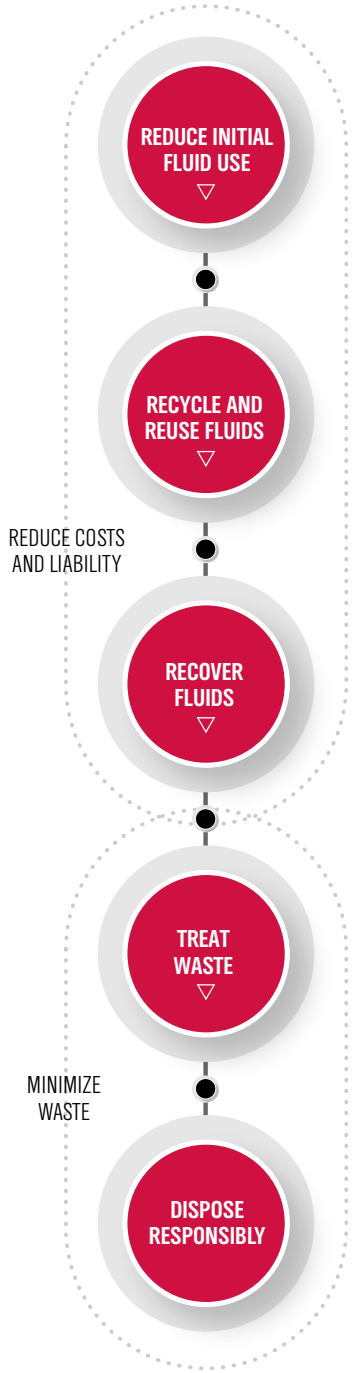
Integrated fluid and waste systems maximize drilling performance and reduce environmental impact.

Drilling fluid design impacts waste management. Two interdependent specialties, drilling fluids and waste management can significantly impact well-construction efficiency.

Our unique service integrates both disciplines to boost drilling productivity while reducing overall costs. From a network of industry-leading laboratories, our knowledgeable professionals leverage decades of experience to create the ideal fluid and waste-management regime for your well.

We draw from a deep selection of fluid systems that range from conventional to custom-designed drilling, drill-in, and completion fluids. We then match the optimal fluid regime to our advanced waste-management systems. Together, our integrated service increases drilling rate-of-penetration (ROP) and minimizes net waste and overall fluid costs.

OUR PHILOSOPHY



FLUID SYSTEMS

ACHIEVE MAXIMUM ROP WITH OUR INDUSTRY-LEADING FLUID SELECTION

There is no fluid requirement that we can't meet. We can fulfill most needs with a wide range of drilling, drill-in, and completion fluids. For unique environments, our global labs provide the ultimate in custom fluid systems. From aqueous to specialty systems, our fluids help you to mitigate drilling hazards, optimize bit performance and cuttings transport, and minimize nonproductive time.

AQUEOUS DRILLING-FLUID SYSTEMS

Our water-based fluid systems help you to reduce the HSE impact of your operation. Formulated for an extensive variety of applications, WEL-DRILL™ water-based mud systems maximize drilling performance in environmentally sensitive areas.

WEL-DRILL system
A nondispersed KCl polymer fluid that reduces solids

WEL-DRILL CPG
A nondispersed polymer fluid that uses cloud-point glycols to increase inhibition

WEL-DRILL HP
A high-performance fluid that maximizes inhibition, improves ROP, and increases wellbore stability

WEL-DRILL Plus
A high-temperature drilling fluid

WEL-DRILL S
A silicate-based fluid that improves inhibition and enhances wellbore stability in unconsolidated or fractured formations

WEL-DRILL F
A formate, salt-based, inhibitive drilling fluid that reduces solids

WEL-DRILL C
An amphoteric fluid that uses cationic additives

WEL-PHASE
A re-usable water-based fluid that meets environmental restrictions while maintaining the performance of oil-base mud

NON-AQUEOUS DRILLING-FLUID SYSTEMS

We can help you to safely achieve high-performance drilling in HPHT and other challenging environments. WEL-VERT™ fluids deliver performance in extreme well environments. Offering a wide range of standard fluids, these systems deliver thermal stability in unconventional and offshore wells.

WEL-VERT system
An invert-emulsion fluid in which mineral oils and synthetic organic liquids form the external phase and various salts–including $CaCl_2$, NaCl, and formates–form the internal phase

WEL-VERT D
An invert-emulsion fluid in which diesel forms the external phase

WEL-VERT FR
An invert-emulsion fluid with rheological properties that stay constant over a wide range of temperatures that is typically applied in deepwater applications and wells with narrow equivalent-circulating density (ECD) windows

WEL-VERT Plus
An invert-emulsion fluid optimized for downhole temperature exceeding 350°F (177°C)

DRILL-IN FLUID SYSTEMS

Our drill-in fluids avoid formation damage and prevent rapid pore-throat bridging while maximizing filtration control. By reducing the interaction between the filtrate and pore fluid, our systems minimize fluid invasion and avoid precipitation (scaling) and other forms of conduit constriction, including polymer deposition, fines mobilization, wettability change, and emulsion blockage.

WEL-DRILL RDF

A water-based reservoir drill-in fluid that prevents or minimizes reservoir damage

WEL-VERT RDF

An invert-emulsion reservoir drill-in fluid that minimizes wettability changes and emulsion blockage and can be formulated into any base fluid—including diesel, mineral oil, and synthetic organic liquids—through use of acid-soluble weighting and bridging agents, emulsifiers, and wetting agents

ENGINEERED FLUID SYSTEMS

We can meet any reservoir requirement with a custom fluid system. Our global laboratory teams engineer a customized solution for any formation anywhere in the world.

SPECIALTY PRODUCTS

- Shale-control additives
- Lubricants and surfactants
- Wellbore cleanout chemicals
- Production-enhancement chemicals
- Plug and squeeze materials

COMPLETION FLUID SYSTEMS

HSE-compliant completion brines set the stage for an efficient completion. We provide chemical compatibility between your formation and fluid systems with a complete range of brines that include our proprietary SafeBrine™ system and associated completion chemicals.

NaCl

A monovalent salt with densities up to 10 lb/gal (1,198 kg/m^3) and 1.20 specific gravity (SG)

KCl

A monovalent salt with densities up to 9.7 lb/gal (1,162 kg/m^3) and 1.16 SG

$CaCl_2$

A divalent salt with densities up to 11.6 lb/gal (1,390 kg/m^3) and 1.39 SG

$CaBr_2$

A divalent salt with densities up to 14.2 lb/gal (1,702 kg/m^3) and 1.70 SG

SafeBrine system

A low-corrosion, environmentally friendly alternative to chloride and halide salts that is available in densities from 1.02 to 1.86 SG

Corrosion inhibitors

A treatment that can be used in all drilling applications–including air, mist, and foam–along with completion and packer fluids

Scale inhibitors

A chemical treatment that prevents the formation of oilfield scale deposits on the surface of metals and other materials

Hydrogen sulfide (H_2S) scavengers

An amine-resin and zinc-based product that is compatible with water-based and nonaqueous fluids

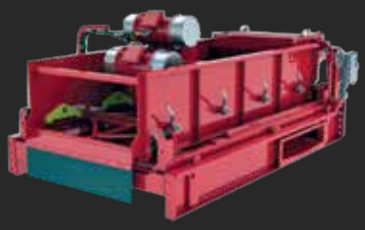
DRILLING-WASTE MANAGEMENT

MINIMIZE NET WASTE AND OVERALL FLUID COSTS

Our waste-management philosophy begins with fluid selection. High-quality equipment and decades of experience can reduce your operating expenses and minimize environmental risk. Our complete array of waste-management equipment—for solids control, containment and handling, recycling and recovery, and treatment and disposal—deliver premium performance at any wellsite anywhere in the world.








SOLIDS CONTROL

Our systems safely remove solids from the drilling fluid. We design, manufacture, and service a comprehensive range of solids-control equipment that includes Prospector™ shale shakers, shaker screens, centrifuges, agitators, degassers, and mud-mixing systems.

CONTAINMENT AND HANDLING

Our systems safely handle and contain drilling waste. We help you to maintain regulatory compliance and industry best practices with a complete selection of screw conveyors, tank-cleaning systems, containers, pit liners, and tanks.

RECYCLING AND RECOVERY

We help you to shrink your operating costs and environmental impact by recovering more of your drilling fluids and reducing losses. Using our drying-shaker and centrifugal-dryer systems, we help to reduce the amount of fluid retained on cuttings.

TREATMENT AND DISPOSAL

We help you to comply with disposal and zero-discharge regulations. As part of our Engineered Fluids Management℠ service, we identify the optimal disposal solution by analyzing fluid type, environmental restrictions, and waste streams.

ENGINEERED WASTE-MANAGEMENT SYSTEMS

When your needs go beyond standard systems, our global teams can engineer custom waste-management solutions for any wellsite.

ENGINEERED FLUIDS MANAGEMENT℠ (EFM℠) SERVICE

Maximize efficiency with turnkey fluid and waste-management solutions

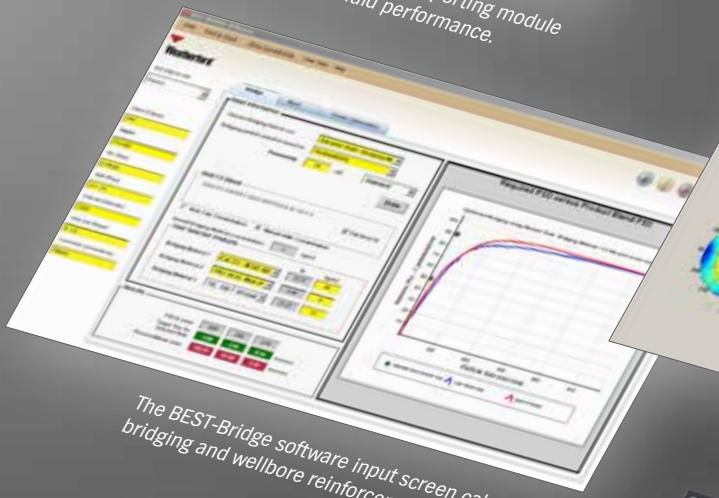
Our Engineered Fluids Management (EFM) service leverages decades of experience, a comprehensive selection of technology, and proprietary software. This service provides a custom-engineered and turnkey plan to optimize your drilling-fluid, completion-fluid, and waste-management programs.

By focusing on the interrelationship between all wellbore fluids and waste management, our engineers plan and execute a complete solution for your wellsite that maximizes drilling performance and minimizes environmental impact. A system-wide data process enables fine-tuning and final-reporting functions.

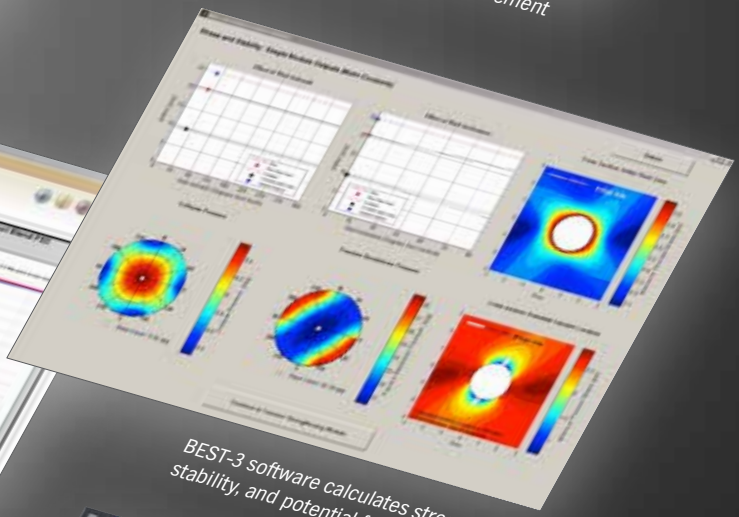
OUR PROPRIETARY DRILLING FLUID SOFTWARE SUITES

The drilling-fluids management reporting module provides an overview of fluid performance.

A simulator helps to plan complex fluid-displacement sequences and wellbore cleaning.



The BEST-Bridge software input screen calculates bridging and wellbore reinforcement figures.



BEST-3 software calculates stresses, wellbore stability, and potential fracture strengthening.

The drilling-waste management reporting module provides an overview of your operation.

The OneSync® planning and main hydraulic engine provides fluid-dynamics analysis.

MAXIMUM PERFORMANCE. MINIMAL IMPACT.

To tap into our breadth of drilling fluids and associated waste management services for maximum performance with minimal environmental impact.

WEATHERFORD.COM/FLUIDS

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