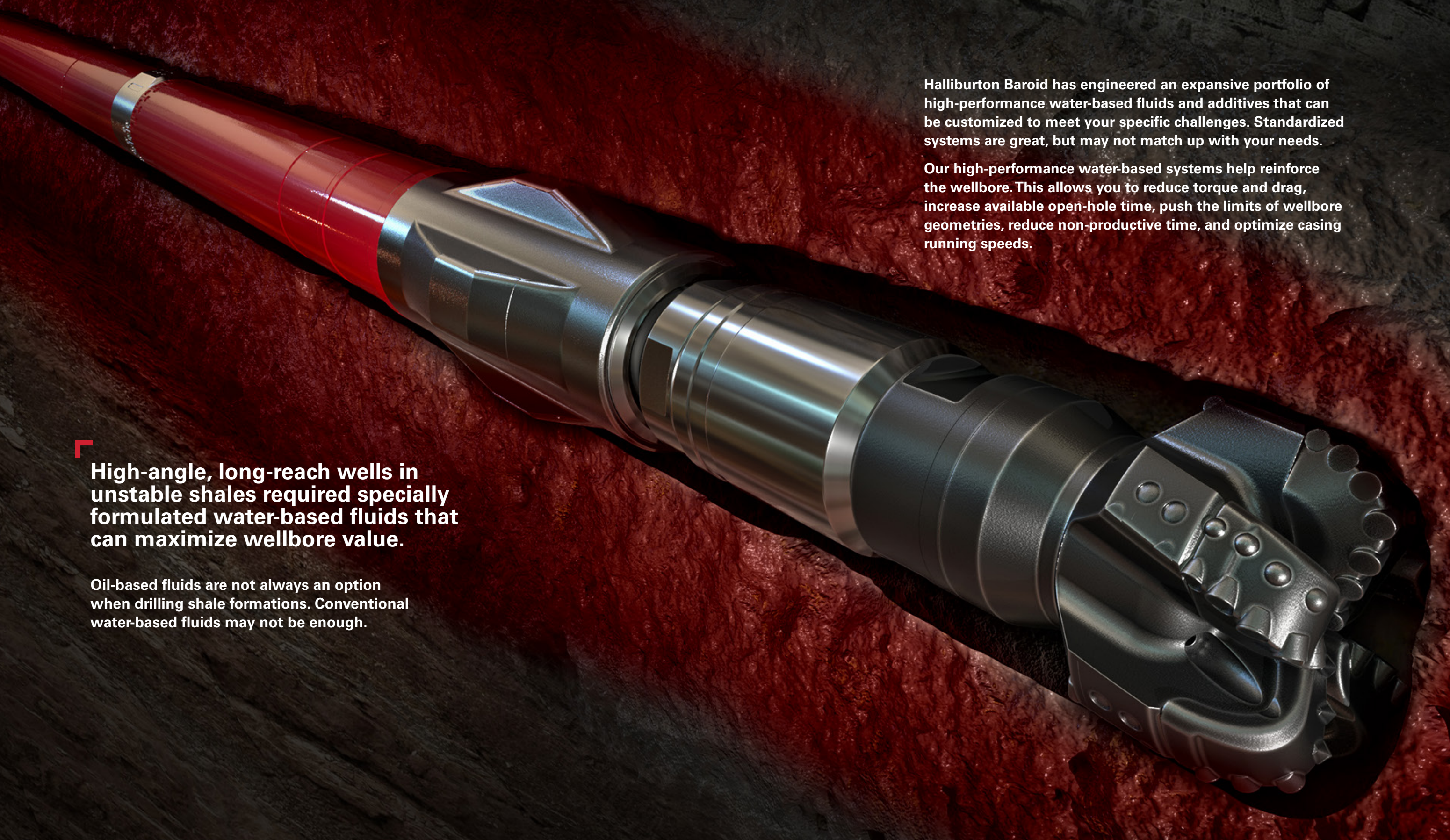




# BaraHib<sup>®</sup>

High-performance water-based fluids





High-angle, long-reach wells in unstable shales required specially formulated water-based fluids that can maximize wellbore value.

Oil-based fluids are not always an option when drilling shale formations. Conventional water-based fluids may not be enough.

Halliburton Baroid has engineered an expansive portfolio of high-performance water-based fluids and additives that can be customized to meet your specific challenges. Standardized systems are great, but may not match up with your needs.

Our high-performance water-based systems help reinforce the wellbore. This allows you to reduce torque and drag, increase available open-hole time, push the limits of wellbore geometries, reduce non-productive time, and optimize casing running speeds.

# Achieve measurable wellbore stability

BaraHib® is Baroid's next generation high-performance water-based drilling fluid. The portfolio includes the standard, Gold, Nano, and Plus products. These fluids help prevent clay hydration and dispersion, minimize fluid loss, and stabilize the wellbore.

## Track, inhibit, stabilize

### BaraHib®

Polymer-based system with sustained inhibition through trackable components. Achieves peak efficiency and run life with optimal solids control equipment.

### BaraHib® Gold

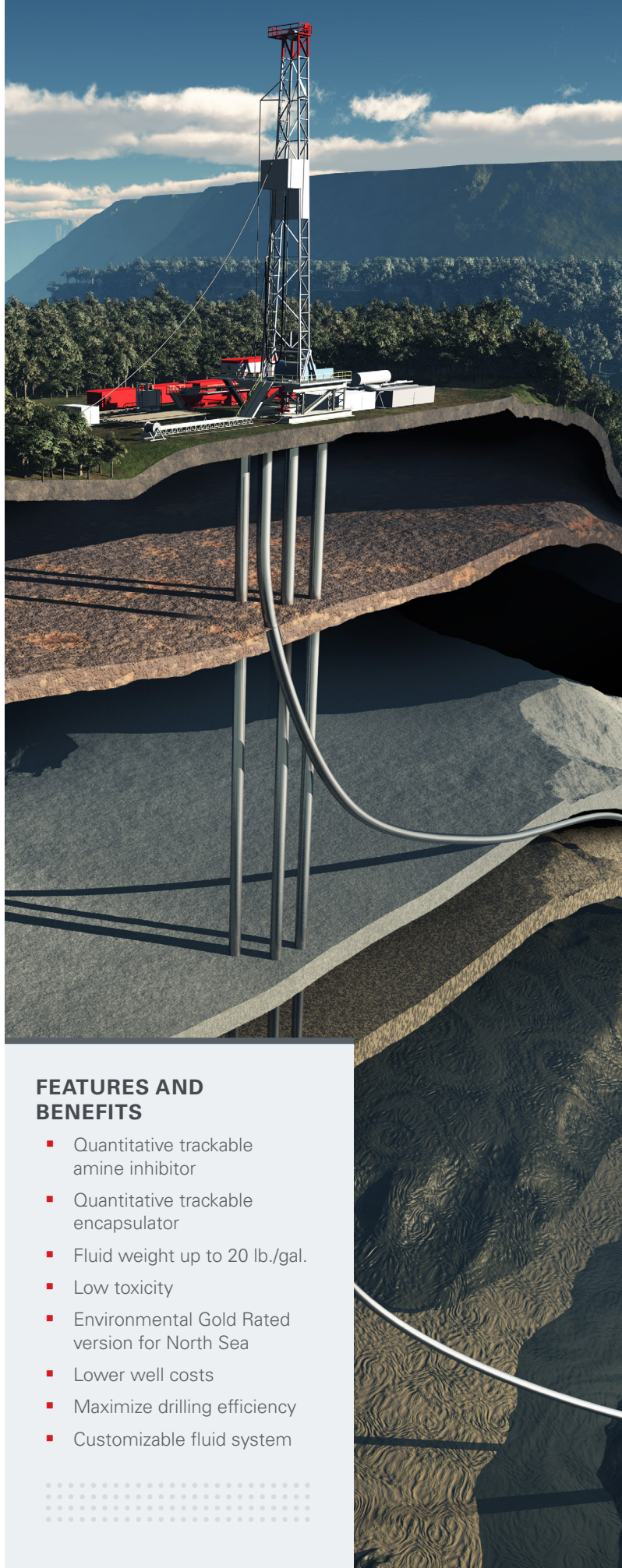
Specially engineered version for environmentally-sensitive areas with reactive shale formations.

### BaraHib® Nano

Nanoparticle-enhanced version for the reduction of invasion and enhanced wellbore stability. Proven to stop pore pressure transmission.

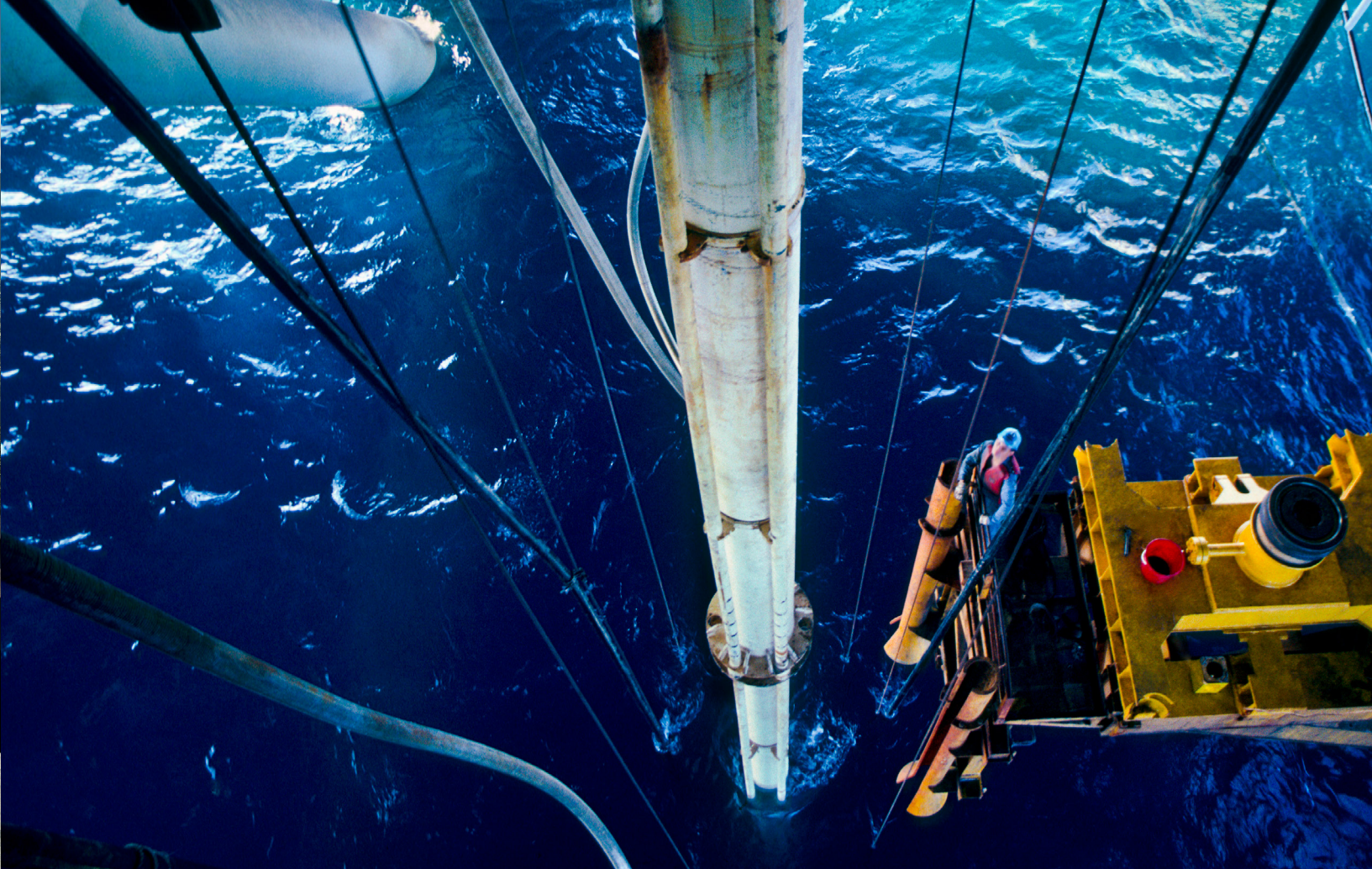
### BaraHib® Plus

Built with inhibitive additives, synthetic filtration control polymers and stabilizing additives for high temperature service.



### FEATURES AND BENEFITS

- Quantitative trackable amine inhibitor
- Quantitative trackable encapsulator
- Fluid weight up to 20 lb./gal.
- Low toxicity
- Environmental Gold Rated version for North Sea
- Lower well costs
- Maximize drilling efficiency
- Customizable fluid system



### Track

Product depletion is an unpredictable consequence of any drilling operation. To maximize efficiency in product usage, it is important to know exactly what is in your system. Formations that contain hydratable shale or mixed layers of reactive clay can lead to wellbore instability issues.

Baroid fluid engineers track shale inhibitor concentrations through quantitative measurements instead of the volumetric tracking approach commonly used in the industry. Products in the BaraHib system, such as BaraSure® W-674, are trackable in the field.

This innovative tracking method accurately measures amine-based inhibitors. As a result, operators can achieve effective shale inhibition and improve wellbore stability, maximize drilling efficiency, and enhance control over the wellbore.

### Inhibit

Depending on the chemistry of the shale, the clays may hydrate, swell or disperse throughout the mud system.

This can cause a buildup of solids in the fluid and lead to accretion issues, decreased hole diameter, and stuck pipe. These conditions require solutions that inhibit the hydration of clays and minimize reactivity.

Baroid delivers encapsulators, silicates, and amine-containing products that are formulated to mitigate these risks.

### Stabilize

Shales with brittle or fractured layering are easily broken apart when exposed to fast-moving fluids or high annular velocities, and increased downhole pressures.

This can lead to some of the most well-known types of wellbore instability. You will see signs of the wellbore breaking down as cavings come over the shakers and fluid consumption increases. This requires proactive solutions that strengthen and stabilize the wellbore before it receives too much exposure to the degenerative elements of drilling. Baroid delivers shale stabilizers, bridging agents, and nanotechnologies to maximize wellbore stability.

# Which fluid is right for you?

BaraHib systems are optimized for intermediate sections containing shale formations.

Focal Point	BaraHib®	BaraHib® Gold	BaraHib® Gold+	BaraHib® Nano	BaraHib® Plus
Solution For	Sustained, trackable inhibition	Environmentally friendly inhibition	Environmentally friendly shale stability	Shale stability	High temperature inhibition (400°F/204°C)
Key Products	Encapsulator/Amine Combo	BaraSure® W-546 BaraSure® W-674	BaraFLC® Gold	BaraFLC® Nano-1, BaraSeal™-957	BaraFLC® W-950, BaraVis® W-637
Existing Areas	Global	North Sea	North Sea	Caspian Sea, Middle East	Middle East, Australia, Latin America
Clay Free	Yes	Yes	Yes	Yes	Yes
Silicates	Available	Yes	Yes	Available	Available
Trackable Inhibitors	Yes	Yes	Yes	Yes	Yes
<b>Nanoparticle Sealing</b> <small>Proven on shale pressure transmission testing</small>	No	No	Yes	Yes	No
Max Temperature	275°F/135°C	275°F/135°C	225°F/107°C	350°F/177°C	400°F/204°C

# BaraHib applications

BaraHib systems are optimized for intermediate and reservoir sections that contain shale formations.



## 1 CASPIAN

BaraHib Nano applied in 12.25-, 8.5- and 6-inch sections through sands and shales.

- Extreme overbalance pressures that reached 5,900 psi
- Particle plugging apparatus results were less than 15 mL
- 45% reduction in torque

## 2 NORWAY

BaraHib Gold system trialed in Barents Sea in 2018

- Drilled >40 well sections; mainly highly deviated through reactive formations
- Tracked and improved fluid maintenance
- Reuse of fluid volumes

## 3 ALASKA

Verification of amine tracking test methods in 2020 (BDF-976)

## 4 MIDDLE EAST

BaraHib and BaraHib Nano fluids applied in multiple offshore and onshore operations.

- Vertical and inclined sections drilled through difficult Nahr Umr shales
- Temperatures reached 302°F (150°C)
- Combined polymeric and amine inhibitors with nanoparticle sealing polymers

## 5 AUSTRALIA

BaraHib Plus applied in 8.5- and 6.125-inch slim-hole sections.

- BHT>235°F; final section >2,000-foot lateral
- Applied BaraSure® W-988 and Performatrol® shale stabilizers
- Achieved smooth casing runs to total depth — even with >5 days of open hole delay

# Tiny solutions for huge problems

Most land drilling applications intersect shale formations that are prone to instability when drilled with water-based fluids. Chemical inhibition only addresses the wellbore surface and drilled cuttings. Mechanical issues can occur within days as the filtrate slowly penetrates the shale matrix, increasing pore pressure in the near wellbore.

This pressure may build to the point where shale breakout or sloughing occurs, which can often lead to high costs.

Baroid's nanocomposite wellbore sealant, BaraFLC Nano-1, is formulated to seal depleted, weak formations when drilling reactive shales. The tiny nanoparticles bind tighter together than conventional sealants. They prevent filtrate invasion, seal shales, and stabilize vulnerable formations.

High concentrations of traditional filtration control additives could achieve similar results. But most combinations of starches and synthetic polymers would contribute excessive viscosity to the fluid. BaraFLC Nano-1 delivers tight filtration control with only minor effects on the fluid's rheological profile.

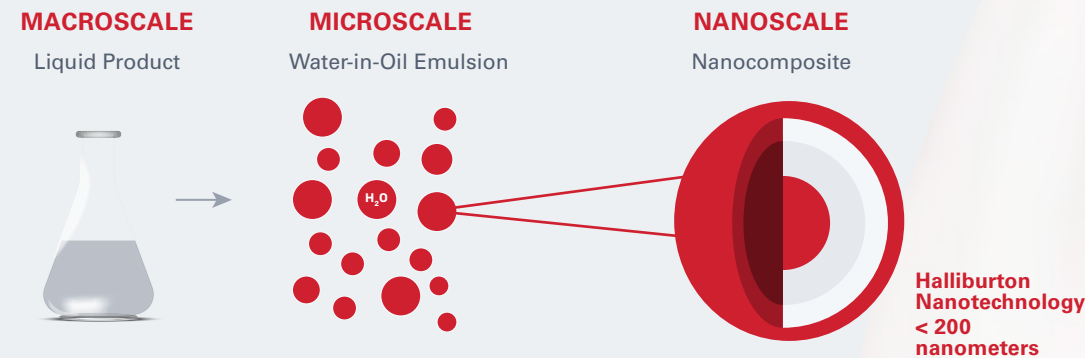
**BaraHib Nano**  
BaraFLC Nano-1



## Lab-proven for filtration control and pressure sealing

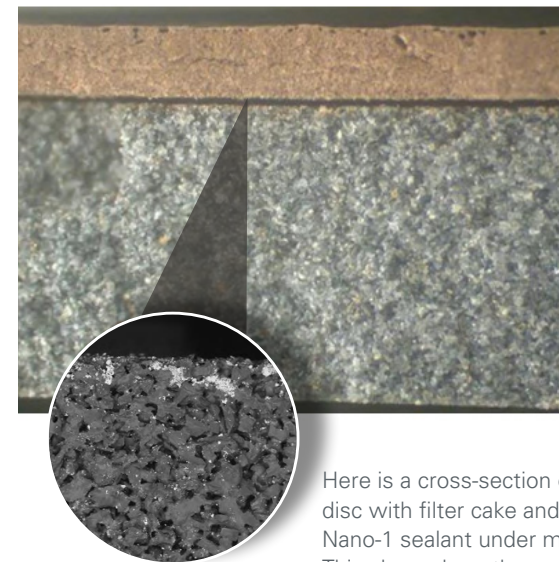
BaraFLC Nano-1 sealant outperforms legacy sealant products with ultralow filtration on the full range of permeabilities — from 5 to 120 microns.

**BaraFLC Nano-1** wellbore sealant is a nanocomposite suspension that provides enhanced sealing capacity to water-based drilling fluids. The individual nanoparticles fill voids in formations and filter cakes.



### NANO IN ACTION

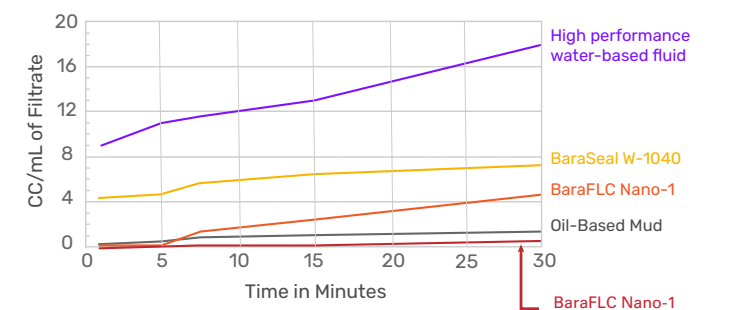
Water-based fluids form a filter cake over time. The images below show an example where nanoparticles seal the face of the permeable disc. This results in minimal invasion and increased stabilization.



Here is a cross-section of a ceramic disc with filter cake and BaraFLC Nano-1 sealant under magnification. This shows how the nanoparticles pass through the cake and seal pore space.

### BARAFLC NANO-1 VERSUS CONVENTIONAL METHODS

Particle plugging at 200°F with 1,500 psi, 10-micron disk.



120°F	Base HPWBF	BaraSeal W-1040	BaraFLC Nano-1
Rheology	—	10.5 lb/bbl	5.0 lb/bbl
600	67	89	88
300	45	62	61
200	36	49	49
100	25	34	34
6	8	10	10
3	6	8	8
PV	22	27	27
YP	23	35	34
Gels	7/9	9/10	10/12



# The Baroid experience



### About Baroid

Baroid is the world's largest and oldest drilling fluids company, in operation since 1929. Our value proposition — engineered fluid solutions customized to maximize wellbore value — creates tailored solutions that boost customers' operational efficiencies to reduce costs, and/or increase the number of barrels they produce. Baroid has unrestricted access to Halliburton's vast network of resources, including people, facilities, labs, and digital systems. We use this network to deliver solutions for your most difficult technical and operational challenges — everywhere it matters.

### Journey to Zero

The Journey to Zero service quality and safety program is an evergreen initiative focused on the pursuit of zero safety and service quality incidents.

Nothing is more important than the safety of people and protection of the environments in which they work. That is why we have a full-time, senior-level team charged with the improvement and enhancement of health, safety, and environment (HSE) and service quality programs. Our company-wide HSE and service quality initiatives encompass personnel safety, process assurance, and execution.



## How we deliver value

The Baroid team harnesses the power of Halliburton to deliver the highest levels of service quality and best technologies to maximize the value of our customers' assets. We focus on three critical areas in the total fluids management equation:



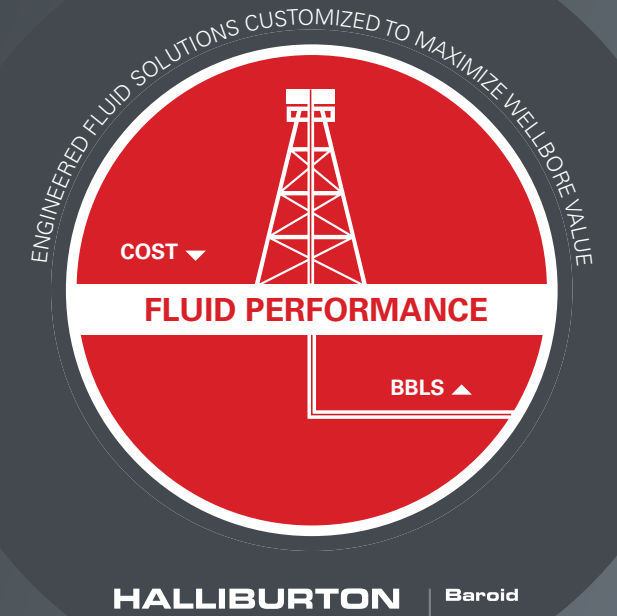
Advanced Fluids and Chemistry



Solids Control Separation and Handling



Digital Enablement



### Technical process and Black Book workflow

The Baroid technical process and Black Book workflow, shown below, is the foundation for how we execute a well. We align our resources with your business objectives, execute our technical and operational plans, and present the value to you. We continuously improve our operations with digital systems, such as the Drilling Fluid Graphics (DFG™) hydraulic modeling software and HindSight™ 20/20 customer portal.





---

**For more information, go to [halliburton.com](https://www.halliburton.com)**

At Halliburton we collaborate and engineer solutions to maximize asset value for our customers. All products and service solutions are available as integrated offerings or as discrete services, based on customer requirements.

H014618 01/2024 © 2024 Halliburton. All Rights Reserved.

**[halliburton.com](https://www.halliburton.com)**



**HALLIBURTON**