



CS OILFIELD

SPECIALITY OILFIELD CHEMICALS

AQUA FUSION

INTRODUCTION

AQUA FUSION is a next-generation high-performance water-based drilling fluid system engineered by CS OILFIELD to overcome the challenges of highly reactive shales, depleted zones, and unstable formations. It delivers exceptional inhibition, thermal stability, and wellbore integrity under demanding downhole conditions.

What sets AQUA FUSION apart is its dual-system capability: the system is designed with a suite of products that allows field engineers to tailor formulations for both high-performance inhibition and wellbore strengthening. Whether operating in harsh shale environments or transitioning to abnormal pressures, AQUA FUSION provides a seamless platform for optimized drilling efficiency and formation protection.

The system integrates key components from CS OILFIELD’s proprietary portfolio, ensuring synergy between salts, shale stabilizers, encapsulators, ROP enhancers, viscosifiers, and fluid loss agents for enhanced performance across drilling programs.

TYPICAL FORMULATION

KEY COMPONENTS (System-defining functional additives)

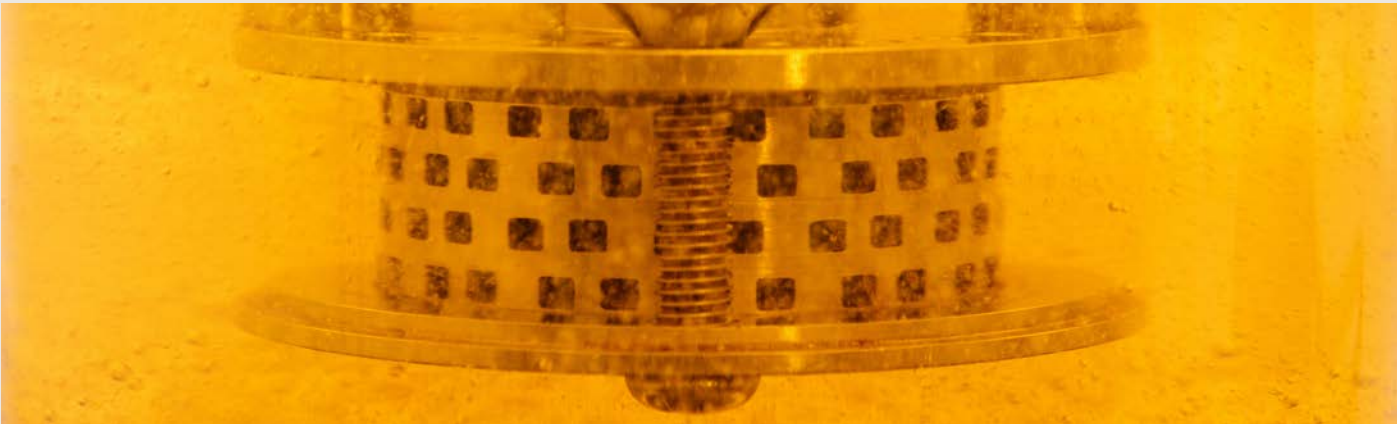
PRODUCT	FUNCTION	APPLICATION CONDITIONS
SWELLEX	Shale inhibitor	1.5–2.5%
DRILL FUSION	ROP enhancer	1.5–2.5%
CS LUBE E	Lubricant	0.5–1.5%

SYSTEM ADVANTAGES

Superior Shale Inhibition
AQUA FUSION provides robust inhibition against reactive clay swelling and dispersion, supported by dual ion sources (KCl and NaCl) that lower water activity and reduce osmotic influx.

Reduced Dilution Rates
The system is formulated for stability and cuttings encapsulation, minimizing the need for frequent dilution and enabling consistent mud properties over longer intervals.

Thermal Adaptability
Can be extended for higher-temperature applications through the inclusion of CS FL RDF and CS T STAB X, allowing flexible system design up to HPHT regimes.



WIDELY AVAILABLE SUPPORTING MATERIALS

PRODUCT	FUNCTION	EXAMPLE CONCENTRATION
KCl / NaCl	Inhibitors	3–8%
CS PAC LV / CS STARCH	Filtration control	3–5 ppb each
CS XAN	Viscosifier	0.5 ppb
CS CaCO ₃	Bridging agent	>20 ppb
CS GRAPHITE	Wellbore strengthening	4 ppb
Barite	Weighting agent	As required
CS CAUSTIC	pH control	As required

SYSTEM ADAPTATION TO SPECIFIC CONDITIONS

PRODUCT	FUNCTION	EXAMPLE CONCENTRATION
CS FL RDF	HTHP fluid loss control	For HPHT conditions
CS T STAB X	Thermal stabilizer	For elevated temperature
CS VIS BR	Viscosity enhancement in brine	For brine variants
CS FLA-301	Fluid loss additive for brine	For brine variants

PERFORMANCE HIGHLIGHTS

(Rheology after Hot Rolling @160°F, 16 hrs)

YP > 15

HPHT Fluid Loss < 12 cc / 30 min

API Fluid Loss < 5 cc / 30 min

pH Control > 9.2 after aging

Sand Invasion Control Total < 5 mm after 30 min

SYSTEM FLEXIBILITY

(Rheology after Hot Rolling @160°F, 16 hrs)

Can be custom-designed for:

HPHT environments (Modifications to enhance pressure/temperature stability, with T STAB X and CS FL RDF)

High salinity completion environments (Enhancing the salt tolerance with addition of CS VIS BR + CS FLA-301)

Reservoir drill-in (Minimal formation damage)

TYPICAL APPLICATIONS

Horizontal and extended-reach wells

Depleted or fractured formations

Sensitive shale formations

Reservoir drilling zones with sealing and fluid loss control



CASE STUDY

AQUA FUSION™ Water-Based Fluid System Powers Breakthrough Drilling Performance in Turkey's Gabar Field

1. Background / Objective

The Gabar oil field, located in Turkey's southeast, represents one of the most significant energy discoveries globally in recent years and the largest in Turkish history. The field's rapid development has propelled national energy independence, with daily production **reaching up to approximately 80,000 barrels per day (bpd)**—a milestone that sets new benchmarks for domestic oil output. This transformative project required advanced drilling technologies to safely and efficiently access deep, complex reservoirs while minimizing environmental footprint and ensuring operational reliability.

2. Challenging Regional Geology

The region is characterized by highly reactive and aggressive shales, notorious for their tendency to swell, hydrate, and destabilize the wellbore during drilling. These reactive clays pose a significant risk of stuck pipe, excessive torque, poor hole cleaning, and frequent non-productive time (NPT). Achieving stable drilling performance in such formations requires exceptional shale inhibition and precise fluid property management.

3. Solution / Approach: AQUA FUSION™ Fluid System

To address these unique challenges, CS OILFIELD deployed its AQUA FUSION™ high-performance water-based fluid system. The system was engineered to deliver:

- Extreme inhibition, ensuring wellbore stability in aggressive clay environments
- Consistent system rheology, optimized for minimal dilution and fluid loss
- Superior lubricity and filtration control, supporting safe drilling at high rates of penetration

A key indicator of shale inhibition was the **Methylene Blue Test (MBT)** value, which was consistently kept below 15.00 throughout the operation—representing a reduction of approximately 62% compared to typical values observed in similar regional conditions.

4. Execution

The AQUA FUSION system was implemented across 3,000 feet of drilling in the Gabar Field's most demanding intervals. Continuous real-time monitoring enabled precise control of fluid properties, while adaptive fluid engineering minimized the need for excessive dilution or chemical additions.

5. Results / Benefits

Extreme Inhibition: MBT values consistently held below 15.00, reflecting the system's robust ability to control clay reactivity and maintain wellbore integrity—achieving a substantial reduction well beyond regional norms.

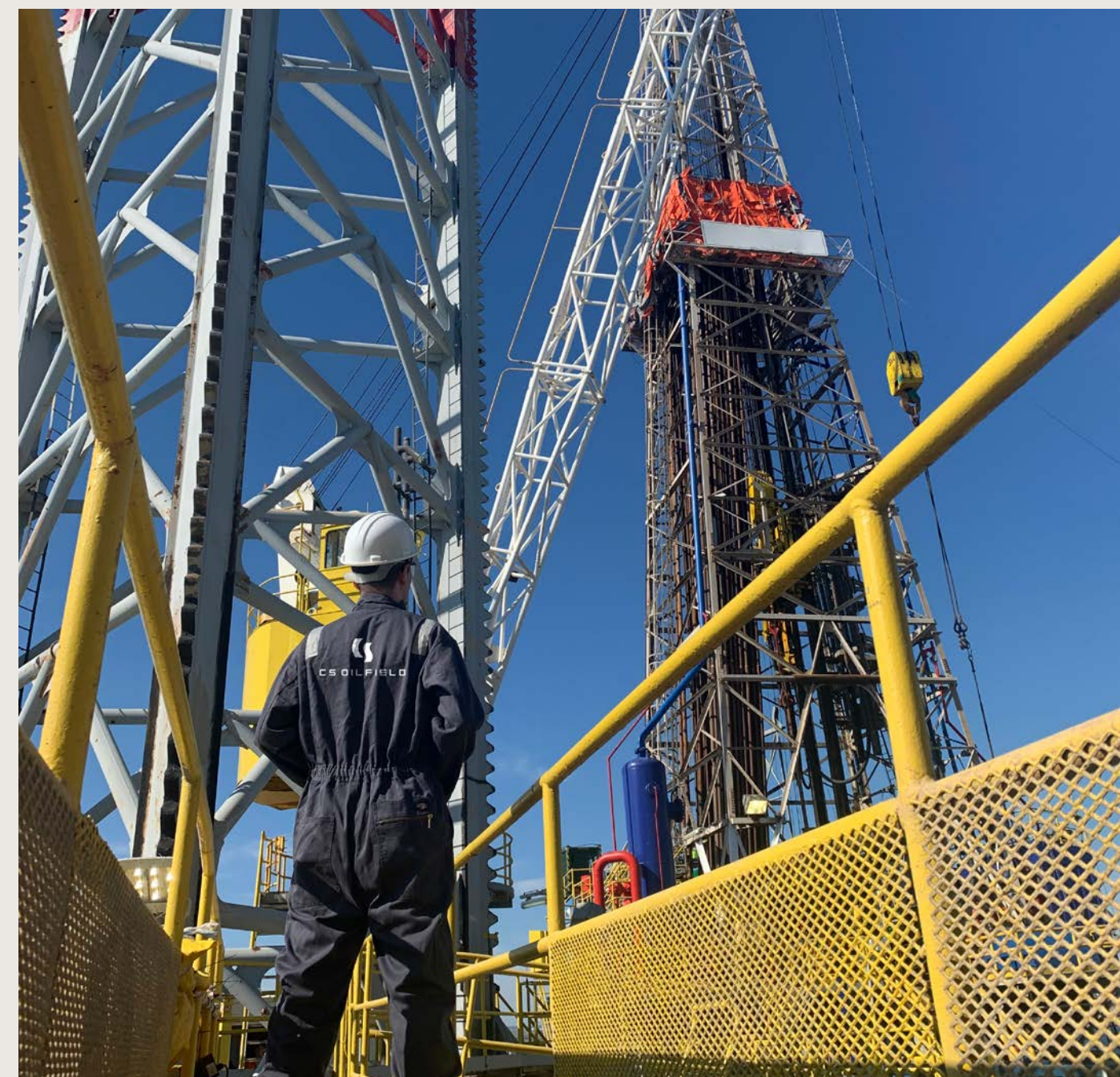
Minimal Dilution Required: Over 3,000 feet of drilling, total fluid dilution remained below 10%, a substantial improvement compared to the typical regional benchmark of 46%.

Operational Efficiency: Reduced dilution requirements translated into lower chemical consumption, reduced waste, and streamlined logistics, supporting both cost efficiency and environmental goals.

Reliable Drilling Performance: The AQUA FUSION system enabled uninterrupted drilling through historically troublesome intervals, supporting the field's rapid development timeline.

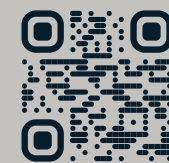
6. Conclusion / Key Takeaways

By maintaining extreme inhibition, CS OILFIELD helped enable Turkey's most important energy discovery of the decade—delivering measurable improvements in shale control, fluid efficiency, and operational reliability. The AQUA FUSION system demonstrates how advanced fluid design can unlock value in the world's most demanding formations and support the ambitious goals of transformative energy projects.

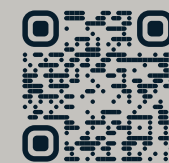




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