

QBAM L

Generic System Name: Inhibitive water-based drilling fluid.

General description:

Category: The system is an inhibitive sea water based polymer fluid. All components of the system are liquid.

Application: The QBAM L mud system is applicable where moderate to reactive formations are present and water based fluids are required. The QBAM L mud system is comprised basically of three components: POLYMAX L, INHIBIMAX, and MAXCAP L. These products are liquid additives. The main purpose of applying the QBAM L is to have a fluid that is easily mix in offshore operations by using sea water.

The POLYMAX L is a blend of polymers that provide viscosity and filtration control. INHIBIMAX is the chemical clay inhibitor. MAXCAP L is the mechanical clay inhibitor. Combining these three additives, the resulting fluid has very good rheological properties, low filtration values, good lubricity and it can be mixed extremely quickly saving rig time. It was specifically designed to be able to build large volumes while having severe losses.

If more clay inhibition capability is needed, the system is compatible with different salts such as potassium chloride, ammonium chloride, potassium acetate or sulphate.

Replacement for: Other inhibitive WBM such as Silicates or Amine salts based inhibitive systems.

Key aspects

- Q Saves time and costs
- Q Very easy to mix
- Q Designed to deal with severe mud losses
- Q Work with all SCE

Water-Based Drilling Fluids

Components: QBAM L

<i>QMax Product</i>	<i>Function</i>
<i>Sea Water</i>	Continuous phase
<i>Caustic Soda</i>	Alkalinity control
<i>*POLYMAX L</i>	Viscosifier, filtration control, encapsulation
<i>*INHIBIMAX</i>	Clay inhibitor
<i>*MAX CAP L</i>	Encapsulation

* Proprietary or brand name product

Typical System Properties

<i>QBAM L</i>		
<i>Property</i>	<i>Range</i>	<i>Min / Max recommended</i>
<i>Mud Weight, ppg (kg/m³)</i>	8.58 (1030)	7.5 Min. (900)
<i>Plastic Viscosity, cP</i>	ALAP	ALAP
<i>Yield Point, lb/100ft² (Pa)</i>	25 - 50 (12.75 - 25.5)	> 25 (>12.75)
<i>Gels, lb/100ft² (Pa) 10"/10'</i>	2-10 / 16-30 (1-5 / 8-15)	As required
<i>pH</i>	9.0 - 10	10.0 Max.
<i>API Fluid Loss - cc/30min</i>	8.0 - 14	< 14

Key aspects

- Q Keep low drilled solids content
- Q Can be highly inhibitive if required
- Q POLYMAX L also provides encapsulation
- Q Good filtration and rheological values

Field Operations

Mixing Procedures

For new system: Start with clean tanks and sea water. While mixing Add caustic soda, to provides the pH and helps to make insoluble the divalent ions from seawater, Add POLYMAX L to build the viscosity and control / reduce the fluid loss, Add INHIBIMAX for clay inhibition, and finally Add MAXCAP L for mechanical inhibition. The mixing time is ~ 30 minutes to build 630 bbl (100m³) of this system, having proper mixing equipment and high shear mix hoppers. Otherwise, system will not reach the desired properties.

For mix “on the fly”: Not necessary but will help for specific cases where mixing equipment are not provides enough shear rate while prepares QBAM L.

Maintaining Properties

In case having circulation return, add each material as it is necessary.

Recommended run the mud check to evaluate the properties, inhibitor content, fluid loss, and special attention for rheology.

If Potassium source is used, then add sufficient potassium material to compensate for water additions and down-hole depletion.

Adequate solids control equipment, desander/desilter (if still in use), fine mesh screen shakers, and centrifuges should be considered absolute necessities with this mud system.

Control pH in the 9.0 to 10.5 range with mono ethanol amine or caustic soda. Corrosion rates can be reduced with oxygen scavengers (sodium sulfite).

Diligent monitoring and maintenance of pH required. It is important that some hydroxide is evident in the alkalinity analysis to help keep the system stable and reduce bacterial contamination.

Fluid Specific Tests and Equipment

- Potassium ion test kit to measure K⁺ ion concentration
- PHPA test kit to monitor MAXCAP L polymer concentration
- Complete WBM testing kit

Contaminants: effect and treatment

<i>Contaminant</i>	<i>Mud Effect</i>	<i>Treatment</i>
<i>Bacteria</i>	Filtration increase; pH drop; carbs/bicarbs increase; odour; aeration; viscosity drop	Bactericides; increase pH to 9.5 – 10.0
<i>Calcium</i>	Lower effectiveness of MAXCAP L and other polymers if > 1800 mg/L, high filtration	Soda ash
<i>Cement</i>	High pH with high calcium; pH > 12.0 decrease in rheology if MBT low	Citric or Sulfamic Acid; Bicarb to lower calcium < 1800 mg/L
<i>CO₃-/HCO₃-/CO₂</i>	No OH ⁻ in alkalinity analysis; “gritty” mud if > 3,000 mg/L combined	Lime to precipitate carbonates and Caustic soda to increase OH ⁻
<i>H₂S</i>	Odour; black mud; corrosion	Zinc carbonate or oxide; Zinc chelate; scavenging amine; pH 9.5 – 10.0
<i>Inhibition</i>	Over treating with MAXCAP L may cause screen blinding	Reduce PHPA concentration.
<i>LGS</i>	High PV's; K ⁺ and MAXCAP L depletion	Centrifuge and / or dilution; increase concentration of inhibitors
<i>pH</i>	High pH, lower effectiveness of polymers	Citric or Sulfamic Acid
<i>Salt</i>	Increase chlorides	Live with the effects or convert to a salt system

Operational Recommendations and “Best Practices”

- Recommend drill out cement with fresh water from a short circulating system and discard.
- System is easier to maintain with “proactive” measures such as daily maintenance regime. Concentrated pre-mixes for maintaining or manipulating properties an option.
- Always run all the solids control equipment to avoid LGS build up in the active system. Avoid dilution.
- Diligently measure Potassium ion concentration if potassium source is used, especially in new wells/areas as depletion rates may be high.
- Residual bentonite or solids in tanks deplete K^+ concentration before drill out.
- Run LGS as low as possible to prevent artificial depletion of the K^+ .
- This system is simple and easy to maintain. For effective hole cleaning, special attention must be paid to rheological properties.
- Pilot tests high anionic chemicals to determine effect on mud properties (especially rheology) prior to use in the whole fluid.
- CEC testing is recommended to measure the shale activity for proper inhibitor concentration.
- Highly concentrated shore-based mixture reduces inventory requirements in off-shore operations. Check saturation and TCT values of pure brines prior to mixing.