BENEFITS

- More cost effective than oil-based mud (OBM), with similar properties
- Won’t dissolve salt, mitigating washout
- Immune to loss depletion zones
- Usable in vertical sections for minimal washout
- Reusable in lateral sections where more lubrication is necessary, saving logistics cost
- Compatible with closed-loop mud systems
- Lower risk of water influx compared with OBM
The **FluxDril direct emulsion fluid** addresses the need for a cost-effective solution to drilling through challenging salt formations with water-based muds.

Given the economic and logistical challenges encountered while drilling a well, conventional diluted brine- and oil-based drilling fluids are not always the optimal choice for drilling in the Permian.

- The usability of OBM while drilling through salt and naturally fractured formations is offset by tremendously high logistical and waste management costs. These can account for half the total drilling fluids bill if substantial losses occur or high volumes of water flows are sustained.
- While diluted field brine fluids appear to reduce costs, their performance through salt formations causes significant formation washout, which can lead to other challenges and expenses.
- Most water-based mud formulations lack the engineering flexibility to address the unique drilling conditions required for maintaining salt saturation when drilling through depleted formations.

Recognizing the need to control spending and that no two wellbores are alike, M-I SWACO developed the water-based FluxDril® direct emulsion fluid specifically to address these diverse conditions.

This system provides a fast, robust, and flexible drilling fluid solution that maintains field brine salt saturation over a wide density range. It does this by emulsifying base oil while managing drill solids and water flow event contaminations. The FluxDril fluid delivers an ROP and gauge wellbore comparable to OBM—while reducing losses by managing the density with base oil. The results yield a reduction in the total costs of drilling the well.
Outperforms
Traditional WBM and Mitigates Washout

Conventional water-based drilling fluids have simple formulations and, at first glance, appear to keep drilling fluid costs low. However, when using a closed-loop system, the costs of water supply and hauling excess fluid generated by water flows significantly increases fluid management costs. The standard “dump and dilute” method to manage fluid volume cannot be applied while drilling through salt because it causes extreme washout of the formation due to reduced salinity levels. In addition, significant water flow or lost circulation events require various density changes. As a result, a different water-based approach is needed.

The FluxDril fluid meets the requirements for drilling a gauge wellbore and handling high amounts of drill solids while maintaining ROP. This cost-effective fluid provides a high degree of emulsion stability and overcomes the typical drilling-related problems encountered: salt formations, water flows, sour gas, and mud losses in depleted formations.

In addition to its exceptional drilling performance, the FluxDril fluid also has the ability to recover a significant portion of the emulsified base oil, which reduces drilling fluid cost. The recovered base oil can then be used to dilute the oil-based fluid used in the subsequent lateral section.

To deliver this combination of performance and density flexibility, the FluxDril fluid is engineered with four components:

- **FluxMul** direct emulsifier provides excellent emulsion stability, ensuring that the system remains a direct emulsion with brine while addressing solids and formation water contamination.
- **Duo-Vis** biopolymer viscosifier maintains the rheology profile for good hole cleaning and improved emulsion stability.
- Field brine and base oil are added in the appropriate ratio to reach the desired density.
Works with Existing Brine

FluxDril fluid was designed to work with low- to moderate-hardness saturated field brine without pretreatment. The pH is maintained with lime and avoids caustic soda use.

What’s unique
- Salt-saturated, water-based mud system with low to moderate hardness
- Cost-efficient chemistries
- Stable emulsion
- Low fluid loss
- Density flexibility
- Stable rheological profile
- Simple formulation

How you benefit
- Reduces washout while drilling
- Delivers good ROP in vertical sections
- Handles high water influx
- Promotes trouble-free running of casing
- Provides excellent hole cleaning
- Uses lime for pH adjustment
- Reduces base oil consumption compared with oil-based fluids
- Requires no pretreatment of the field brine
- Maintains accurate mud weight
- Minimizes losses
- Reduces overall pad drilling costs
Operator Upholds Wellbore Stability in Batch Drilling Campaign

An operator drills wells cost effectively while enduring formation challenges; improves washout from 40% to 10%.

The operator’s concerns
An operator needed to overcome washout and water influx while batch drilling the intermediate section of three wells. The problematic formations posed a number of risks to the wells—including extreme washout, high water influx, significant loss zones, hydrogen sulfide gas, and well control events, making it difficult to drill the section with only one drilling fluid. M-I SWACO recommended using the FluxDril fluid instead of dilute field brine or OBM.

What the FluxDril fluid achieved
The ROP (140 to 200 ft/h [43 to 61 m/h]) was comparable to offset wells and had an improved calculated washout of only 10% to 13% vs. 40% when drilled with a diluted brine. The FluxDril fluid endured an average water influx of greater than 1,800 bbl per well and maintained wellbore stability. The drilling fluid cost was reduced by nearly 20% vs. similar wells drilled with an OBM that had encountered lower volumes of water influx.
The FluxDril fluid was able to withstand more water influx than OBM while still maintaining wellbore stability.
FluxDriI direct emulsion fluid

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