



GageDrill® MMO allows a Canadian operator to drill tough surface holes through problematic loss zone, averting use of cement, and reducing drilling time and fluids' cost

The GageDrill® MMO (Mixed-Metal Oxides) system uses bentonite and a mixed metal oxide complex to give the drilling mud a unique viscoelastic rheology profile with the ability to inhibit losses while maintaining higher pump rates when drilling through loss zones. The exceptional low-end rheology and high static gel strengths make it an ideal fluid for improved hole cleaning in a larger hole size.

CHALLENGE	SOLUTION	RESULT
<ul style="list-style-type: none"> Severe lost circulation on the prior surface hole drilled on the pad. This resulted in high LCM usage, and NPT when dealing with lost circulation and waiting on cementers/cement plugs Pump rates had been compromised due to the loss zone which potentially could induce hole cleaning problems in the larger size (406mm) hole 	<ul style="list-style-type: none"> GageDrill MMO system was used to enable drilling through the loss zone while maintaining higher pump rates 	<ul style="list-style-type: none"> Losses were managed through the viscoelastic properties of GageDrill rather than mixing conventional LCM; resulting in reduced mud usage and lower chemical costs Cement plugs were not required also resulting in substantial cement and NPT savings Higher pump rates were maintained through the loss zones enabling sufficient hole cleaning

OVERVIEW

The operator was returning to a development pad where a prior surface hole had been drilled with major lost circulation two years prior. The prior hole was a 311mm surface hole which had been drilled with a conventional Gel slurry system and had a bill exceeding \$55,000 due to the lost circulation material (LCM) as well as excess products used when encountering losses. The current development plan called for a larger hole size and thus the new surface holes being drilled on the pad were 406mm in diameter. Drilling the larger hole became a major concern because of lower annular velocities in the larger hole size from a hole cleaning perspective.

The GageDrill MMO system was used to allow the operator to drill through a loss channel that had previously required conventional LCM along with cement plugs. The GageDrill system provides a viscoelastic fluid at a steady-state that is readily shear-thinning during drilling but solidifies when not in motion as it enters the loss formations and acts as a plug, preventing losses.

CHALLENGE

One of the major concerns when facing the losses was that pumping rates need to be reduced in order to control the fluid volumes being lost to the formation. This could also result in a dangerous hole cleaning problem where the annulus could potentially become loaded with solids.

The original surface hole on the pad took about three and a half days to drill due to the problematic loss zone that was encountered from a suspected shallow sand channel. They had also used a large quantity of mud additives and LCM products to combat the losses. The operator did not want to



spend additional money and lower the total time on the surface hole, with a big component of personnel simply waiting for the cementers to arrive. Furthermore, there was the additional time needed to allow the cement plugs to setup and heal the loss zone.

SOLUTION

GageDrill was used as a means of allowing the operator to drill through the loss zone while still maintaining higher pump rates, due to its unique gel structure that becomes elastic when not being agitated.

In addition, due to GageDrill's outstanding low-end rheology, better hole cleaning could be achieved in the larger hole size. The combination of both would allow the operator to continue drilling to TD while experiencing significantly reduced losses. At that point, they could then run casing and cement.

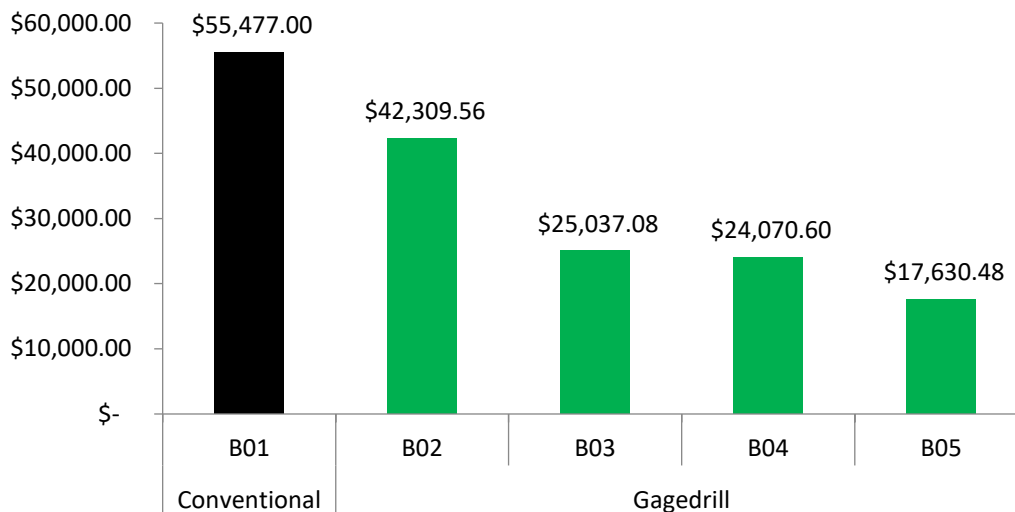
RESULTS

The prior well "B01" had drilled a 311mm surface hole using the conventional approach of gel and LCM to try to control losses. This had resulted in a high amount of drilling fluids products used and a large mud bill. More costly was the excessive NPT due to trying to slow drilling while managing the losses, waiting on cementers to arrive at the site, pumping cement plugs, and allowing the plugs to set.

GageDrill MMO was used on the subsequent 406mm surface holes on the pad, which would be an increase of about 70% in hole volume. Despite a 70% increase in drilling fluid required for the hole size increase, the total mud cost was cheaper due to less volume lost and no LCM being used.

As the chart below indicates, each subsequent well had consistently lower drilling fluids chemical costs due to the reusability of the GageDrill system with the cost of the final well coming in at just 32% of the cost of B01.

Total Drilling Fluids Cost (Chemicals and Service)





Although the pump rates were reduced while drilling the loss channel, they were brought back up to the normal rates once past the problem zone, and then maintained to TD without a stoppage in drilling.

No hole cleaning issues or pack-off problems occurred, and most importantly casing was run in the fluid without inducing a lost circulation event. 100% excess cement volumes were used on B02-B03-B04, with each seeing all volume returned to the surface. The operator elected to lower the cement volume pumped for the final well after the initial success to 75% excess, and again saw all returns to the surface.

Although the initial mud cost savings is easy to quantify, the additional savings on the pad from an NPT and cement cost point of view could have exceeded well over a million dollars.

Surface Hole Spud to TD Hours

