

# KLA-SHIELD Inhibitive System Enhances Execution of a Well in Villamontes Area - Bolivia

“The fluid system in combination with DWM performed exceptionally well, with minimum treatment required to maintain property specifications. Good integrity cuttings were observed at the shakers. I would strongly recommend this system for future wells in this area.”

Jorge Moyano, Operation Manager, M-I SWACO

## Well Information

Location .....	Villamontes, Bolivia
Spud.....	April, 2010
Interval drilled.....	8 ½-in. section for a total of 1,946 m (6,385 ft) – from 904 to 2,850 m (2,966 – 9,350 ft)
Bottomhole temperature.....	82°C (180°F)
Mud weight .....	1.2 sg (10 lb/gal)
TD .....	2,850 m (9,350 ft)

## The Situation

The previous well drilled in the Villamonte field experienced myriad downhole problems. The clay inhibition characteristics of the polymer-inhibitive PHPA mud system used in that well was insufficient to minimize the wellbore problems common to this field. The drilling problems began early in the well when the operator encountered severe drag when POOH at 1,992 m (6,535 ft) that was followed with stuck pipe. On the sidetracked section, wellbore instability recurred, leading to a second sidetrack. The drilling was marked by the presence of plastic and highly reactive clays that plugged the shakers and bit, precipitated BHA balling, and owing to the higher active solids content increased solids contamination significantly. Upon examining the causes of wellbore instability that led to second sidetrack, the operator noted that the programmed density was insufficient to maintain hole stability and that clay inhibition was inadequate. The results were considerable non-productive time to drill the side track, and higher costs for fluid maintenance and disposal.

On planning the next well, the operators requested a drilling fluid with a cost-effective inhibitor that when combined with excellent service support could effectively manage the troublesome clay and mitigate the slow drilling it had experienced.

## The Solution

M-I SWACO proposed its KLA-SHIELD\* system, an organic polyamine -based inhibitor that had been used successfully in the operator’s drilling campaign the previous year. For this project, M-I SWACO also was requested to design a water-base mud system that would provide the best possible inhibition to minimize any operational problems. Several laboratory tests were carried out to compare inhibitive properties for various product concentrations. KLA-STOP\* amine-based inhibitor showed the highest performance at a concentration of 5-8 lb/bbl.

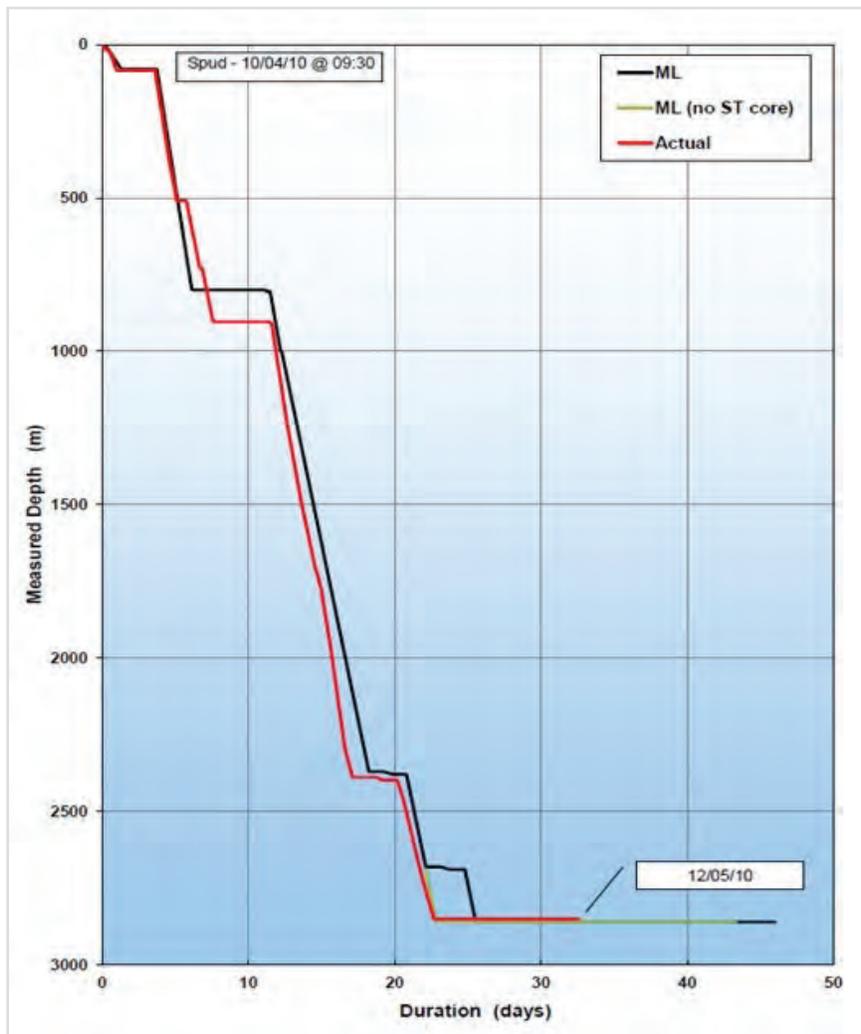
In addition, the use of the KLA-STOP additive as a primary shale inhibitor in conjunction with the DRILZONE\* anti-accretion and ROP enhancer additive was proposed to form a high-performance water-based system for drilling the reactive claystone formation. Further, the customer and M-I SWACO engineers jointly designed a density curve that considered using a higher mud weight in the sections where the previous well experienced the most severe wellbore instability.

**The Results**

By using the KLA-SHIELD mud, the operator achieved excellent drilling results in the interval, with the actual time-depth curve ahead of the plan. This was possible due to:

- Increased chemical stabilization in claystones and fractured shales
- Reduced clay dispersion and hydration with excellent cuttings integrity observed throughout the entire interval
- Considerable reduction in dilutions volume
- Minimized the tendency for bit and BHA balling
- Maintained NPT to the minimum level allowed
- Required no sidetracks or the dealing with other issues related to wellbore instability
- Made trips safer and faster compared to the previous well
- Facilitated successful logging operations

**TGT-4 Time-Depth Curve**



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## The Details

A designed INTEGRATED FLUIDS ENGINEERING\* (IFE\*) project, this well incorporated M-I SWACO fluids, solids control and Drilling Waste Management (DWM) services, the latter allowing for continual flocculation and de-watering to remove drill solids and facilitate re-use of the water with inhibitors. While the cost per bbl of the newly prepared KLA-SHIELD fluid was higher than the drilling fluids used previously in the area, tracking of the IFE benchmarks and drilling performance showed the KLA-SHIELD fluid and DWM tandem added value to the customer's operation.

The mud properties were stable throughout the well, with the system demonstrating superb fluid loss control (< 5 mL/30min) and hole cleaning (YP of 16-22, 6 rpm of 6-9). The optimum concentration of KLA-STOP organic inhibitor was maintained at 5-8 lb/bbl, while the anti-accretion / ROP enhancer DRILZONE B\* was kept at 5-7% v/v.

While over-pull was recorded at 900 m (2,953 ft) and 1,250 m (4,102 ft) no incidences of pack-offs were recorded. When back on bottom after trips, no fill or obstructions were encountered, indicating good hole cleaning and an in-gauge and stable wellbore. At TD, the trip out of the hole was smooth, the wireline logs were obtained with no trouble and the casing run to bottom and cemented in place without incidents. No signs of wellbore instability were seen even after the long periods of time exposure, allowing normal tripping exercises where only the last few meters from the bottom were back-reamed.

### Questions? We'll be glad to answer them.

If you'd like to know more about the KLA-SHIELD system and how it's performing for our other customers, please call the M-I SWACO office nearest you.



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