

# Wintershall Drills 13,330-ft Well with 3,281-ft Lateral in 70 Days Using KLA-SHIELD System, Neuquén Basin

Enhanced-polymer water-base drilling fluid system provides excellent wellbore stability for challenging shale play, Argentina

**CHALLENGE**

Drill a well in a challenging, geomechanically complex Vaca Muerta shale play while maintaining good shale inhibition and a high rate of penetration (ROP).

**SOLUTION**

Use the KLA-SHIELD\* enhanced-polymer water-base drilling fluid system optimized with STARGLIDE\* ROP-enhancing lubricant and DRILZONE\* ROP-enhancing antiaccretion additive.

**RESULTS**

Drilled the well successfully to 13,330-ft [4,063-m] MD including the 3,281-ft [1,000-m] lateral in 70 days without any caving, swelling, or tight wellbore issues.

**“Wintershall Argentina considers this to be a technical success.”**

**Hans Rehbock**  
Drilling & Completions Manager  
Wintershall Argentina



**Avoid wellbore collapse and hydrocarbon influx from the formation**

Wintershall Argentina planned to drill a 13,330-ft well with 3,281-ft lateral with a 6½-in hole size in the Vaca Muerta Shale of Argentina’s Neuquén basin. The challenging formation includes abnormally high pore pressure, natural fractures, stresses, and general geomechanical complexity resulting from the regional stress regime, narrow mud-weight window, and gas influx. Because of the narrow mud-weight window, ECD management was critical and required precise control to avoid tensile failure and subsequent wellbore collapse or an influx from the formation. In addition to these complexities, torque and drag were major mechanical issues in the planned section. Wintershall needed to drill the entire well with a water-base mud while maintaining hole integrity and drilling efficiency.

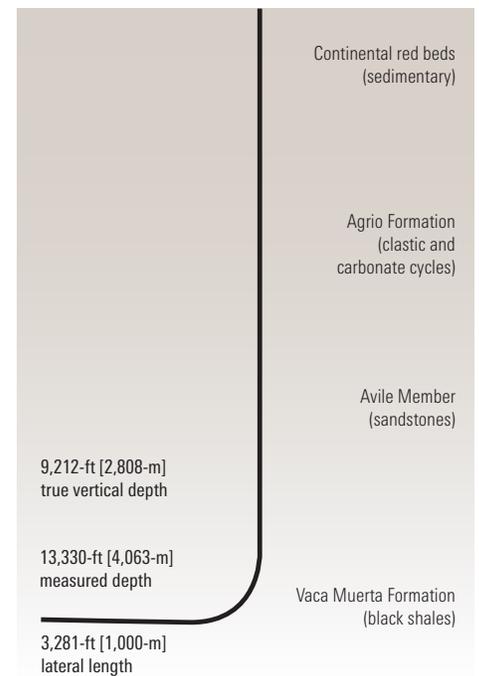
**Achieve high performance and excellent clay inhibition with the KLA-SHIELD system**

M-I SWACO proposed using the KLA-SHIELD enhanced-polymer water-base drilling fluid system to deliver high ROP, improved hole quality, and an enhanced HSE profile. To maintain a low coefficient of friction for reducing torque and drag, the STARGLIDE lubricant and DRILZONE additive were added to the fluid system at 5.61–7.02 lbm/bbl [16–20 L/m<sup>3</sup>]. M-I SWACO also added KLA-HIB\* amine-base shale inhibitor and IDCAP D\* polymeric shale inhibitor for clay inhibition and encapsulation, respectively.

Because of the narrow mud-weight window, Drilling Office\* integrated drilling software and VIRTUAL HYDRAULICS\* drilling fluid simulation software were used for tracing the well trajectory, performing torque and drag simulations, evaluating the rheology in terms of ECD management, and optimizing hole cleaning.

**Demonstrate effective alternative to oil-base mud**

An RSS was used to drill the well to minimize tortuosity. In consideration of the potential crude oil influx, a laboratory test was performed to determine the tolerable oil concentration for the 6½-in section to help control rheology, ECD, and lubricant concentration. Based on the laboratory results, the ECD was controlled and held to less than 2.1 relative density. A computer simulation was used for determining the mud weight required to avoid tensile failure.



*The Vaca Muerta Shale presents complex geological challenges in reaching the deep TVD, then requires long-lateral wells to be economic.*

## CASE STUDY: Wintershall drills 13,330-ft well with 3,281-ft lateral in 70 days using KLA-SHIELD system, Neuquén basin

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To maintain the ECD and enhance hole cleaning, fluid density was held constant, rheology was kept low, flow rate was held within a fixed range, weighted pill use was minimized, and low-gravity solids were kept at low values. Backreaming was not required for maintaining wellbore integrity.

Wintershall drilled the well—including its 3,281-ft lateral—to TD at 13,330-ft MD in 70 days. The drilling fluid system obtained excellent inhibition with no caving, swelling, or tight hole issues, even after the open hole was exposed for 33 days. In this underbalanced drilling application with oil influx to 8% contamination, the KLA-SHIELD system proved to be an excellent alternative to oil-base mud.

The low-viscosity pill helped to clean the bit, improving ROP after each pill run. Enhancing the KLA-SHIELD system with STARGLIDE lubricant and DRILZONE additive improved lubricity, resulting in an ROP increase to 22 ft/h [6.7 m/h] on average in the 6 $\frac{1}{8}$ -in section. Running the casing was accomplished in 33.75 h.

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