

Vertical Drilling System Achieves 0.15° Inclination, Minimizing Departure at 5.45 ft in 13,235-ft Well

PowerV system automatic inclination hold maintains verticality, despite dipping, to land small target for PDVSA

CHALLENGE

Maintain verticality in formation known to contain high dips, and position well within small target.

SOLUTION

Use PowerV* vertical drilling system to hold inclination at absolute minimum, while also increasing drilling performance.

RESULTS

Drilled 13,235 ft MD to TD with maximum inclination of 0.15° and maximum displacement of 5.45 ft.

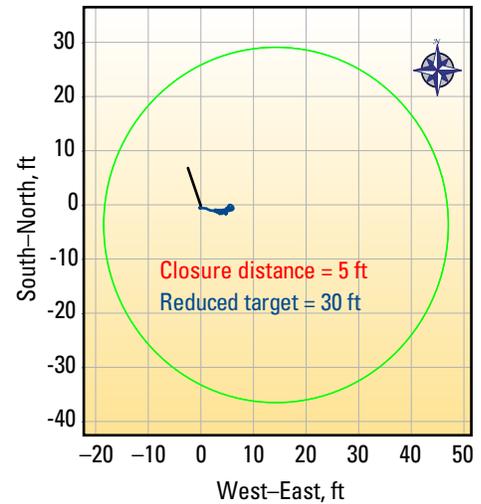
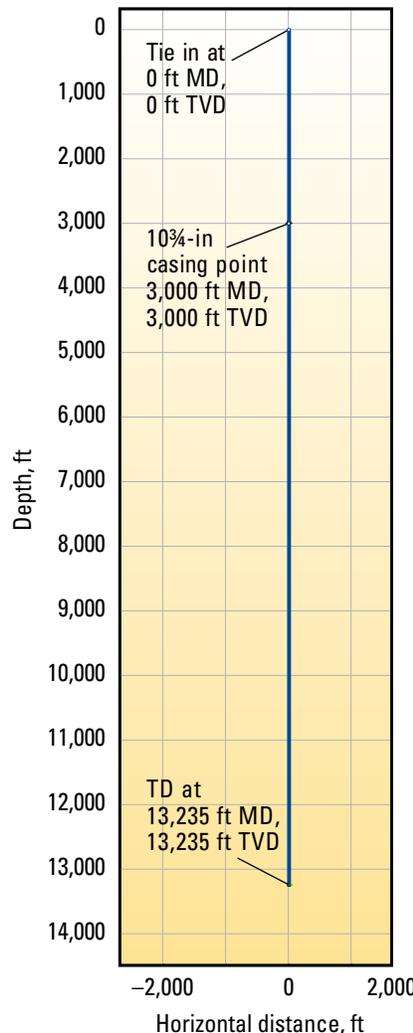
This project demonstrated the PowerV RSS outstanding vertical hold capability it in complex zones.



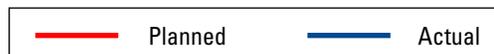
Drill highly dipped formation in Maracaibo Lake

Petroleos de Venezuela (PDVSA) maintains constant drilling activity in the Maracaibo Lake. One of the most demanding drilling projects is in Block V Field Lamar VLE-0326 area, where the geological structure behavior is characterized by faults and high dips that result in small targets and make it difficult to maintain verticality. These challenges increase drilling time to achieve objectives, so PDVSA wanted to maximize both performance and reservoir exposure in its next well.

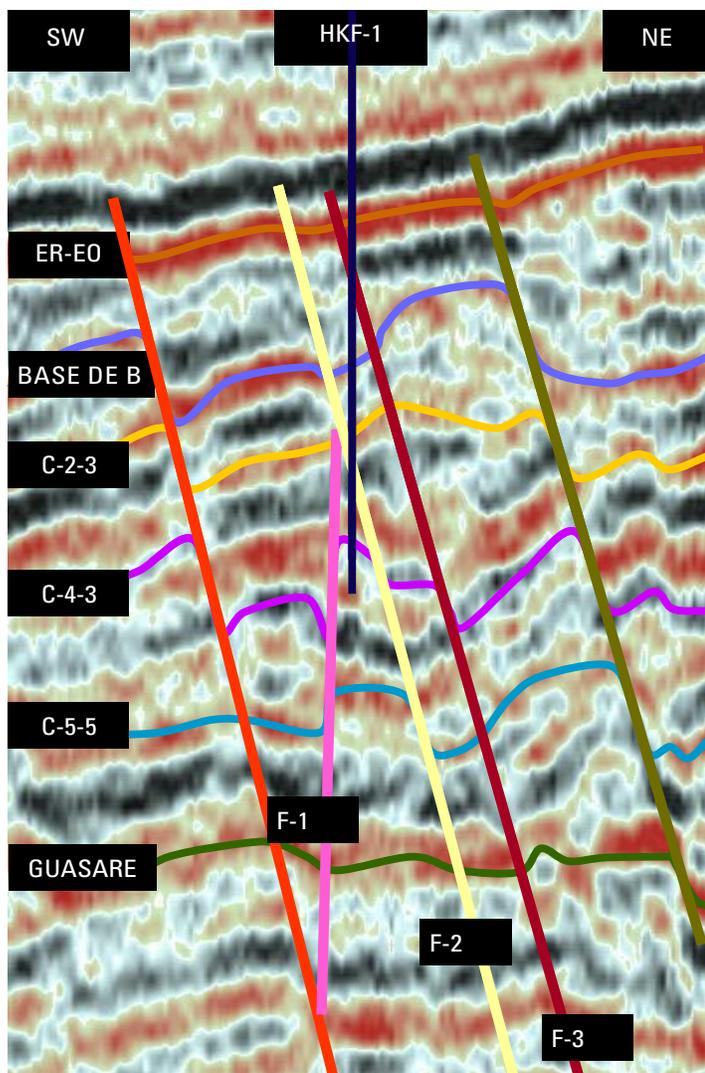
The HKF-1 well was planned to drain a sand reservoir with estimated potential of 400 bbl/d. The reservoir was flanked by three normal faults with dips ranging from 75 to 80° that delineated the target tolerance of 30 ft in any direction.



The PowerV RSS drilled the vertical well to the reduced target with maximum inclination of 0.15° at TD and closure distance of 5.45 ft, compared with plan to maintain verticality for 0-ft departure.



CASE STUDY: Vertical drilling system minimizes departure at 5.45 ft in 13,235-ft well for PDVSA



Maintain verticality to reach small target surrounded by faults

Schlumberger provided the PowerV vertical drilling system for the job to ensure proper positioning of the well, improve hole quality, and increase efficiency. With automatic inclination hold, the PowerV RSS could minimize verticality, even when surrounded by highly dipped faults, and power through to TD. Its fully rotating design meant less risk of differential sticking and better hole cleaning.

At 9,590 ft MD while drilling at average ROP of 100 ft/h, the well encountered stability issues attributed to the reservoir pressure of 1,200 psi. The team controlled with issue by increasing mud weight from the planned 9.7 to 10.9 ppg. The increased drilling time it took to safely mitigate the issue adversely impacted performance by reducing planned ROP of 27 ft/h down to 16 ft/h.

Landed in target with 0.15° inclination at TD

PDVSA and Schlumberger used the PowerV vertical drilling system to successfully drill the HKF-1 vertical wellbore to TD, reaching MD 13,235 ft with an inclination of 0.15° and a closure distance of 5.45 ft. With minimal departure, the wellbore stayed well within the 30-ft target tolerance despite the highly dipped faults surrounding the sand reservoir.

For more information contact your Schlumberger representative.

PowerV vertical drilling system successfully drilled the HKF-1 vertical wellbore to TD, despite a number of highly dipped faults that crossed the planned trajectory.

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