seismicVISION Seismic-While-Drilling Service Optimizes Casing Points and Lowers Costs, Offshore Malaysia

Seismic-while-drilling service successfully performs LWD acquisition in high-pressure ramp environment with zero NPT while eliminating casing section.

**CHALLENGE**
Successfully drill a vertical exploration well offshore Malaysia when faced with hazardous conditions that disrupt the surface seismic image data.

**SOLUTION**
Use seismicVISION* seismic-while-drilling service to identify accurate casing point locations among expected pressure hazards at uncertain depths.

**RESULTS**
- Enabled casing point optimization while drilling.
- Reduced costs by eliminating 9½-in casing.
- Decreased depth uncertainty tenfold.
- Achieved zero NPT while drilling.

Drill when faced with unexpected disruptions to seismic image data
An operator needed to drill an exploration well in a high-pressure ramp environment—that included an expected pressure ramp in the shallow section and a gas chimney in the deeper section that would disrupt the surface seismic image data. These were at a known point in the time domain, but uncertainty in the time-depth conversion meant that the depth of these hazards was not well understood.

Additional analysis of offset well data showed that the sharp pressure ramp was below the potential hazards, through the gas chimney zone. These offset wells were located approximately 10 km away from the proposed well location. Velocity anomalies and the uncertainty in the shallow heterogeneous overburden were expected to affect the structure and position of events deeper down the surface seismic section.

Use logging-while-drilling technology to spot casing points under challenging conditions
Schlumberger proposed using a dual-seismic configuration tool. This would enable real-time vertical seismic profile (VSP) imaging and velocity data for accurate casing point selection, hazard avoidance with successful well construction, and the elimination of a planned casing string. Additionally, the LWD approach would eliminate the need for a pilot hole.

**Actual vs. Plan**

Using the information from seismic while drilling, successive casing seats were optimized. This eventually led to elimination of the planned 9½-in casing because key targets came in earlier in depth during the latter stages of the well.
CASE STUDY: seismicVISION service helps avoid hazards and reduces costs while drilling exploration well, offshore Malaysia

The critical factor for success was the setting of a planned 20-in casing as deep as possible but prior to penetrating the identified potential hazards and gas chimney. The key information required was the actual wellbore velocities to enable accurate time-depth conversion and pore-pressure calculations as well as a VSP for correlation with the surface seismic that provided data ahead of the bit.

**Significantly reduced uncertainty and costs**

The seismicVISION service enabled the casing points to be set more accurately while drilling. Casing points moved nearly 800 m on a vertical well, and this contributed to the well reaching TD without the need to set 9½-in casing, leading to significant cost savings. This information was acquired without affecting drilling operational efficiency on the rig, leading to zero NPT while drilling.

Additionally, the acquired velocity showed that offset well information and surface seismic predrill information could vary greatly from that at the actual location being drilled, especially in the deeper sections. Depth uncertainty was reduced from a predrill error estimation of 200 m (+/-100 m) to less than 20 m (±10 m), despite the presence of gas.

The 15-m-spacing VSP requirement was met by using two seismic collars, which furnished a detailed image of the subsurface, including the gas affected zones. The first arrivals yielded an accurate time-depth relationship. Acquisition flexibility enabled accurate deployment and positioning of the seismic source from a supply vessel.