CHALLENGE
Drill deepwater well vertically for more than 3,800 m in 150-degC [300-degF], high-temperature environment to reach and appraise three target sands.

SOLUTION
Use PowerV HT* vertical drilling system in combination with TeleScope HT* high-speed telemetry-while-drilling service, arcVISION HT* array resistivity compensated tool, and sonicVISION HT* sonic-while-drilling tool.

RESULTS
- Drilled more deepwater footage than in any previous well in West Africa.
- Kept maximum inclination at TD to 0.26°.
- Achieved 38 m/h average ROP with negligible shocks.
- Provided quality LWD data to guide critical decisions that saved 8 days of rig time and USD 8 million.

Drill high-temperature appraisal well
An operator planned to drill a vertical appraisal well offshore West Africa to acquire data for pore pressure management and reservoir fluid analysis in three main target sands more than 3,800 m below the mudline. The challenge presented by the 647-m water depth and the high-temperature drilling environment was compounded by the need to maintain well verticality and drill the 26-in, 17¼-in, 14¾-in, 12¼- by 13½-in, and 10 5/8-in hole sections to the maximum depth possible to ensure reaching the deep target sands. In addition, the operator wanted to reduce or eliminate shocks while drilling to prevent tool failures and attendant problems, especially in the 12¼- by 13½-in section.

Successful data acquisition in high temperatures
The operator achieved its drilling and data acquisition objectives with a combination of Schlumberger technologies. This included a PowerV HT vertical drilling system and TeleScope HT high-speed telemetry-while-drilling, arcVISION HT array resistivity compensated, and sonicVISION HT sonic-while-drilling services.

PowerV HT system automatically maintained verticality while cutting across a sequence of overpressured sand and shale interbedded formations. The drilling team was able to maximize the length of each hole section, allowing the 11¼-in liner to be set 67 m deeper than the planned 4,000 m. Shocks while drilling were negligible, enabling acquisition of high-quality sonicVISION HT data for pore pressure management. Pore pressures calculated from the LWD data matched those acquired with an MDT* modular formation dynamics tester.

Accurate vertical drilling with the PowerV HT system and acquisition of quality real-time arcVISION HT and sonicVISION HT data enabled an informed decision that saved 8 days of rig time and USD 8 million.

The low shock level while drilling the 12¼-in by 13½-in hole section facilitated acquisition of quality sonicVISION HT data.
CASE STUDY: LWD evaluates West Africa exploration well, eliminating casing string

Confidence in accurate real-time LWD data

Despite the HT environment—static temperature was just over 150 degC (300 degF), and circulating temperature was 101 degC (214 degF)—the sonicVISION HT and arcVISION HT tools provided accurate real-time data that enabled the drilling team to make timely, informed decisions. When the deeper prospects were found to be water, it was decided not to run the 9½-in casing in the 10½-in hole section and drill an 8½-in section, saving 8 days of rig time and USD 8 million.

The PowerV HT system not only achieved an average ROP of 38 m/h while drilling more deepwater footage than in any previous West African well, but also kept maximum inclination at well TD to just 0.26°. That was a significant improvement over the average ROP of 5 m/h and maximum inclination of 2.6° in an offset well not drilled with a PowerV HT system.

Contact your local Schlumberger representative to learn more.