Extended-Gauge Bit Coupled with Rotary Steerable System Allowed Interval Completion in One Run, Reducing Drilling Time

Location: Deepwater Gulf of Mexico

OPERATOR’S CHALLENGE – ChevronTexaco needed to achieve extraordinary hole quality in order to obtain accurate data from logging-while-drilling (LWD) and wireline sensors. The company planned a development well to investigate the lateral extent of the reservoir on the Perseus deepwater project. The operator wanted to use the Geo-Pilot® bit on this high-angle well to take advantage of its proven benefits to deliver outstanding hole quality. The top priority was to obtain the finest-quality LWD and wireline data, as this would direct the future drilling plans on this project. ChevronTexaco also hoped to eliminate the cost of pipe-conveyed logging in this 56° well.

HALLIBURTON’S SOLUTION – In order to achieve optimum hole and data quality, Halliburton’s Sperry Drilling services recommended using a Drill Bits and Services, Geo-Pilot extended-gauge PDC bit with the Geo-Pilot® 9600 Series rotary steerable system and suite of LWD sensors, including the azimuthal lithodensity (ALD™) and bi-modal acoustic (BAT™) sensors.

ECONOMIC VALUE CREATED – The operator kicked off the well from vertical, built to 56° of angle and drilled the entire 5,734-foot interval in one run. With an average rate of penetration (ROP) of 164 ft/hr while performing directional work, the LWD sensors achieved excellent data quality, including ALD sensor borehole imaging. Once drilled, ChevronTexaco ran the wireline straight to bottom three times in the 56° hole, eliminating the need for pipe-conveyed logging.

The Geo-Pilot system performed flawlessly and reduced drilling time by four days on this interval, saving the operator an estimated $960,000 in rig rates. The ROP was intentionally limited to acquire high-density LWD data, but still averaged 164 ft/hr. Sperry’s ALD sensor provided high-quality images, which were vital for understanding the regional structure. Low drag values during the run and on the three wireline runs, where line tension was just 300 lb over the weight of the wireline tools, indicated excellent hole quality. All three wireline runs went straight to bottom, as did the casing, with no conditioning run.

This was especially critical since a tropical storm was approaching. The authorization for expenditure (AFE) projected 38 days to drill the well, but ChevronTexaco completed the well in just 28 days, which included 3 1/2 days of waiting on weather.
TECHNOLOGY USED – Sperry Drilling and Drill Bits and Services’ FullDri® technology delivers higher ROP, reduced nonproductive time (NPT) and lower tortuosity. The FullDri service reduces hole spiraling and wellbore tortuosity for improved hole quality; reduces drillstring vibration for improved toolstring longevity, transferring energy to the bit more efficiently and decreasing total time to drill the well; and improves directional performance and control for more accurate placement of the wellbore – lowering overall well costs.

The Geo-Pilot 9600 Series rotary steerable system, part of the FullDri system, delivers steerability with superior hole quality in the rotary drilling mode. The point-the-bit rotary steerable system precisely steers the wellbore while rotating the drillstring, and provides exceptional directional control independent of formation, on-the-fly directional adjustments with zero rig impact, superior hole quality by the use of extended-gauge bits, no hydraulic limitations and built-in geosteering capabilities.

Sperry’s suite of LWD sensors provides petrophysical information similar to that obtained from openhole wireline tools but with added benefit of providing the data in real time while drilling and acquiring the data typically before significant invasion or washout.

The ALD sensor provides high-quality density and Pe logs with improved accuracy and precision, and also valuable formation dip and borehole shape information for geosteering and hole quality applications.

The BAT sensor provides wireline-quality compressional and shear slowness logs in both fast and slow formations. The dual-frequency transmitters and dual seven-receiver array configuration ensure a superior signal-to-noise ratio and measurement redundancy for service reliability.

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