PEMEX Saves Over US$ 30 Million on Cantarell Well by Using a Matched System
Location: Cantarell Field, Gulf of Mexico

OPERATOR’S CHALLENGE – PEMEX, the national oil company of Mexico, recently contracted Halliburton to drill a development well in the Sihil Block formation, which presented a range of possible well control problems. In the faulted upper sections there was risk of total loss of circulation and pipe sticking. In addition, in the 8-½-inch section, there was a probability of washouts and cave-ins, along with the presence of H₂S gas. Finally, the producer formation has high compressibility and high reservoir pressure, making it difficult to control the well in the 6-inch hole section.

HALLIBURTON’S SOLUTION – Halliburton provided an optimized drilling solution to alleviate anticipated well construction problems. For the upper sections, Sperry Drilling services deployed a Geo-Pilot® rotary steerable system, matched with a Halliburton Drill Bits and Services extended-gauge PDC bit, and a suite of measurement/logging-while-drilling (M/LWD) sensors to provide accurate formation evaluation and precise wellbore placement. The Geo-Pilot system uses point-the-bit technology to steer the wellbore in any desired direction while rotating the drillstring and is designed for use with Geo-Pilot extended-gauge bits. The Geo-Pilot bits help minimize non-constructive bit behaviors caused by side-cutting bits, eliminating hole spiraling and minimizing wellbore tortuosity for better hole quality.

To achieve optimum performance in the 6-inch hole section where the formation has very high compressive strength, a GeoForce® enhanced performance range motor and FMH3843ZR bit were run. The GeoForce motor has greater torque output than conventional motors, providing more power to the bit and consistent RPM of the motor, resulting in a higher rate of penetration (ROP), reduced non-productive time and superior hole quality.

Sperry Drilling recommended use of M/LWD tools including pressure-while-drilling (PWD) wellbore pressure measurement services to continuously monitor well pressure and equivalent circulating density (ECD) in real time, and a 4-¾-inch triple combo suite to enable faster response time to unexpected events by replacing wireline logs with real-time formation evaluation information.

To help ensure rapid response while drilling progressed, Sperry monitored the entire operation at the remote operating center (ROC) in Ciudad Del Carmen. The ROC personnel supported the operation in real time, observing data communicated from the LWD quad combo (ABG™ at-bit gamma sensor, EWR™ electromagnetic wave resistivity sensor, ALD™ azimuthal...
lithodensity sensor, CTN™ compensated thermal neutron sensor and BAT™ bi-modal acoustic sensor) and ADT® applied drilling technology drilling optimization service.

ADT service specialists monitored the job around the clock for a successful, incident-free operation. They carefully observed well pressure and ECD, and helped ensure that damaging vibration was mitigated in the highly-compressive formation. Expert ADT service engineers follow the “model, measure, optimize” process, which leverages Halliburton’s specialized software, surface and downhole measurements to deliver analysis and solutions to optimize drilling rates, improve operations efficiency and minimize the impact of unplanned events.

**ECONOMIC VALUE CREATED** – Upper hole sections of the well were drilled in record times, with the critical six-inch section drilled along the directional plan from 3,880 meters (12,730 feet) to 4,080 meters (13,386 feet) at an ROP of 13 meters (43 feet) per hour. The real-time and recorded M/LWD data satisfied PEMEX’s requirements and allowed them to eliminate wireline logging and save precious rig time.

PEMEX planned to drill the well in 228 days, but by implementing Halliburton’s matched drilling solution, drilling time was reduced by 121 days. PEMEX saved over USS 30 million, and Well Sihil-3 was successfully delivered to target with no well control issues.