Case History

Well Construction

PEMEX Uses Geo-Pilot® XL System and XR™ Reamer Tool to Drill in Challenging Plastic Shale Formation

Customer: PEMEX
Location: Mexico

CHALLENGE – PEMEX needed to drill and enlarge a hole section from the vertical kickoff, building from zero to 35 degrees in a 12 ¼ x 17 ½ inch hole section, in a plastic shale formation.

SOLUTION – Halliburton’s Sperry Drilling services provided the Geo-Pilot® XL 9600 series rotary steerable system with a Geo-Pilot® FMF3653 extended-gauge bit from Drill Bits and Services for increased ROP and optimum borehole quality, together with a the XR™ 1200 reamer tool for quality hole enlargement while drilling.

RESULTS – Time reduction of 6.2 days saved approximately US $930,000 in platform costs at US $150,000 per day rig rate.

OPERATOR’S CHALLENGE – PEMEX approached Halliburton with the challenge of drilling a well in a difficult plastic shale formation in the shallow waters of the Bay of Campeche, Mexico. This well is located 113 km north east of Ciudad del Carmen in the ZAAP heavy oil field. Sperry was selected to drill the well after repeated failures by other contractors. The primary challenge for this project was performing drilling and hole enlargement simultaneously, while kicking-off the well from vertical in the plastic shale zone. The plastic shale formation contains a large amount of water and lacks rigidity, and is capable of squeezing or extruding into the wellbore. Drilling in such formations can also cause problems with rate of penetration (ROP) and carries the risk of a washout.

HALLIBURTON’S SOLUTION – Sperry Drilling utilized the Geo-Pilot XL 9600 series rotary steerable system, equipped with a Geo-Pilot FMF3653 extended-gauge bit from Drill Bits and Services. The Geo-Pilot XL system was selected for its ROP delivery, while the extended gauge bit ensured the borehole was drilled in a straight trajectory. Already proven for high-angle
extended reach applications, the XR 1200 reamer tool was used for hole enlargement while drilling, minimizing downhole vibration in the challenging environment. The Real Time Center (RTC) in Ciudad del Carmen supported the operation in real time, providing hydraulics, BHA analysis, and WHIRL™ vibration avoidance software analysis.

**ECONOMIC VALUE CREATED** – The kickoff point was at 1609 meters (5279 feet) in a plastic shale formation with rock strength of 2,000 psi. The team drilled the 12 ¼ x 17 ½ inch hole section of 951 meters (3120 feet), starting from vertical and building to a 35 degree angle to an end depth of 2560 meters (8399 feet) in 28.88 hours. The planned time to drill this section was 11 days; actual drilling took 4.8 days due to the outstanding ROP of 32.9 meters (108 feet) per hour delivered by the Geo-Pilot XL system with XR reamer tool. Time savings of over six days resulted in cost savings of approximately US $930,000 for PEMEX.

This successful experience will prove invaluable for the Geo-Pilot system / XR reamer tool combination for future applications. According to Jose Manuel Pavon Preve, Manager Ku-Maloob-Zaap Operations Unit, Mexico Offshore, “The drilling industry offers more complex challenges each day. We are convinced that with the right technology and highly trained people, we can overcome these challenges and achieve success.”