W&T Offshore Reaches New Pay Zone with GeoBalance® Managed Pressure Drilling Service

MPD SERVICE MAXIMIZES ASSET VALUE IN MAHOGANY FIELD

GULF OF MEXICO

OVERVIEW

Halliburton provided an integrated drilling service including the GeoBalance® managed pressure drilling (MPD) service to complete its first MPD job in the Gulf of Mexico for W&T Offshore. The MPD system was implemented to mitigate drilling risks associated with a narrow 1-pound-per-gallon drilling window. The GeoBalance MPD system, the GB Setpoint™ advanced real-time hydraulic model, and the Geo-Pilot™ rotary steerable system were utilized to safely and successfully drill four sections of the well to reach a total measured depth of 19,494 feet (5,942 meters). Not only was the well drilled safely, but MPD enabled the customer to reach a new pay zone within the formation, maximizing the asset value. Collaboration, a thorough design of service, proper documentation, and focused execution were key elements to successfully drilling the well and achieving the goals of the project.

CHALLENGE

Without MPD, narrow-pressure drilling windows can cause borehole instability, associated shale breakout occurring from pressure cycling of the borehole, downhole mud losses, surge and swab effects, and possible kicks. However, MPD, along with early kick detection methods, can enhance well safety by minimizing potential kick volumes.

The Mahogany field, which is in 372 feet (113 meters) of water, presented a number of risks and drilling challenges. Borehole instability, mud loss issues, and drilling risk mitigation were main drivers for the request for an MPD solution. W&T Offshore looked to Halliburton to provide an integrated drilling solution to safely and effectively drill the intervals within a 1-pound-per-gallon overall pore/fracture pressure drilling window because of the depletion of the upper reservoir creating a significantly smaller operational envelope.

SOLUTION

Halliburton provided an engineered solution that utilized the Geo-Pilot rotary steerable system; GeoBalance MPD equipment; the GB Setpoint advanced real-time hydraulic model, which tracks different fluid densities and rheology to calculate the proper surface pressure to maintain the required downhole density; and the near-constant bottomhole-pressure MPD method. Fluid densities were designed to be just above pore pressure, and constant bottomhole pressure method was used to provide a safer and more efficient way to drill the different hole sections. This technique required that the borehole pressure at the point of control remained constant while circulating and when pumps were off. Using this method eliminated nonproductive time (NPT) due to borehole instability and/or mud losses.
RESULTS
Preparation, planning and job execution resulted in four sections totaling 7,172 ft of subsalt strata being successfully drilled. Controlling the equivalent mud weight and the equivalent circulating density at different target depths with the MPD system allowed the targeted discovery production sand to be accessed with zero NPT.

While drilling the depleted “P” sand section, losses were encountered. A Halliburton crew that was experienced in early event detection, the customer representative’s knowledge of the field, and precise pressure control quickly mitigated the losses avoiding a potentially costly event.

While tripping, maintaining control of the operating hydraulic window was key to mitigating fluid losses/kicks. Using surge and swab, one of the key features of the GB Setpoint model allowed Halliburton to change the equivalent mud weight in real time, and to pump and spot kill mud in stages, thus reducing the amount of kill mud normally used to pull out of hole. These efficiencies reduced the time required to drill and the amount of required mud for the operation, resulting in savings for the customer.

After drilling and casing both the “Q” and “T” sands with MPD successfully, an exploratory tail of approximately 950 feet (290 meters) was drilled beneath the main well target, which led to the discovery of an additional pay interval, known as the “U” sand interval.

Without the Halliburton MPD system, this well would have been extremely difficult, risky, and expensive to be drilled. Tom Murphy, W&T Offshore COO, stated, “The A-18 success exceeded our pre-drill expectations and underscores the large potential in the prolific Mahogany ‘T’ sand. It achieved our main well objectives in the primary target zone and logged 149 feet [45 meters] of pay in a total of five reservoirs. By design, the well penetrated the field’s historic producing intervals – the ‘P’ and ‘Q’ sands – in the highest structural position in the field’s history. This sets up a very attractive attic recovery project in an area of the field with good water drive characteristics and recovery efficiency.

Our exploratory tail has confirmed the presence of hydrocarbon-bearing sands in a trapped position beneath our currently productive ‘T’ sand and further extends the vertical column in the field to these previously unpenetrated reservoirs. The well’s success is expected to generate several high-quality additions to our organic drilling inventory, including a future extension of the main ‘T’ sand based on this most recent penetration, a crestal development well opportunity to exploit the western ‘P’ and ‘Q’ attic area, and deeper drilling opportunities to exploit and target the newly discovered deep ‘U’ sand.”

Tracy Krohn, W&T Offshore’s chairman and CEO, stated, “The A-18 well allowed the company to acquire its first core data from this important reservoir with rock permeability estimated to exceed one darcy, confirming the excellent flow potential of this exceptional reservoir.”