

Drilling with Liner Rescues Well in Deepwater Gulf of Mexico and Saves at Least USD 20 Million

Eliminating a dedicated liner run through a high-loss gassy salt zone reduced rig time by multiple days

CHALLENGE

Drill and case a salt zone exhibiting high fluid losses and gas breakthrough in the deepwater Gulf of Mexico.

SOLUTION

Instead of drillpipe, use liner drilling with the COLOSSUS CMT* cemented liner hanger system and Direct XCD* drillable alloy casing bit.

RESULTS

- Saved the operator at least USD 20 million by drilling and cementing the high-loss zone, avoiding the need to sidetrack or abandon the well.
- Eliminated a dedicated liner run after drilling.



High fluid losses threaten deepwater well reaching its target depth

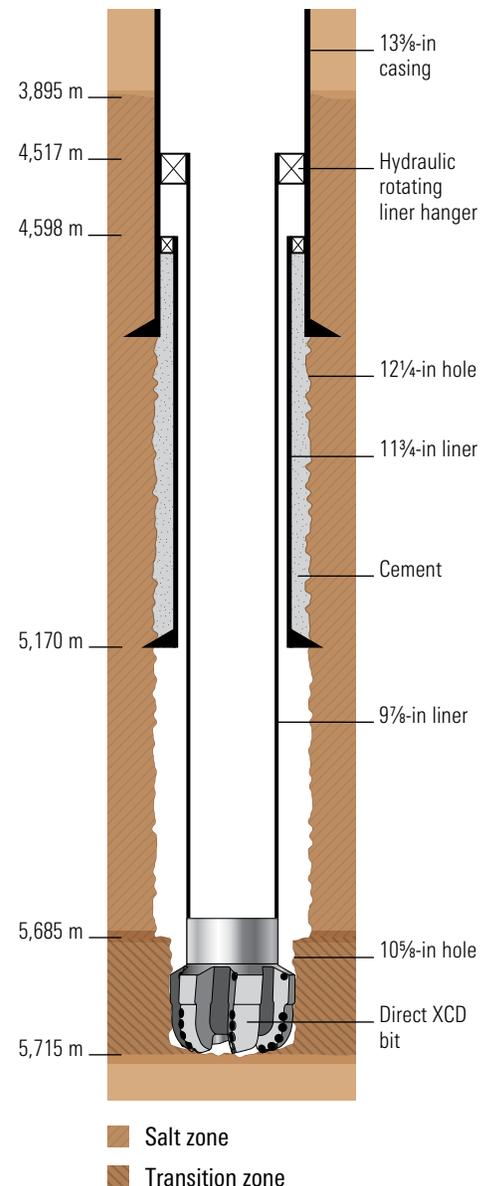
An operator drilling in more than 1,300 m [4,265 ft] of water in the Gulf of Mexico (GOM) had identified a challenging salt layer. Preliminary estimates indicated that it extended from 3,895 m to 4,990 m [12,780 ft to 16,370 ft]. While drilling the 12¼-in section through this layer, however, it was found to extend much deeper. Severe losses resulted in running and cementing an 11¾-in contingency liner from 4,598 m to 5,170 m [15,085 ft to 16,960 ft].

Drilling continued with a 10⅝-in × 12¼-in bit and reamer, but at 5,685 m [18,650 ft] the bottom of the salt layer had still not been reached, severe losses of 200 m³/d [1,258 bbl/d] continued, and gas began to breakthrough at 130,000 ppm. A balanced cement plug placed in the open hole to isolate the losses was unsuccessful and the risk of a stuck drillstring was high, an eventuality the operator wanted to avoid in the presence of gas.

A review of the drilling logs concluded that the bottom of the salt zone was 30 m [98 ft] deeper at 5,715 m [18,750 ft]; this last interval was considered a transition zone, suitable for cementing casing. The operator sought a solution that would enable successful drilling of the transition zone as well as address the potentially problematic running of casing to seal off the salt layer as quickly as possible, hence mitigating the risk of losing the well and having to sidetrack or abandon it.

Liner drilling provides a robust alternative to drillpipe

Schlumberger proposed liner drilling with the COLOSSUS CMT cemented liner hanger system and Direct XCD drillable alloy casing bit. Using a liner as a drillstring smears cuttings into the borehole wall—an action termed the plastering effect—which strengthens the wellbore and



Liner drilling with the COLOSSUS CMT liner hanger system and Direct XCD bit enabled the operator to drill through a salt zone with high fluid losses and gas breakthrough without getting stuck, having to sidetrack, or being forced to abandon the well.

CASE STUDY: COLOSSUS CMT liner hanger system enables drilling through unstable gassy salt zone, deepwater GOM

seals pores in the formation to reduce fluid loss and gas inflow, ensuring that the liner reaches section TD.

A multidisciplinary team used a rigorous Critical Activity Risk Evaluation (CARE) process to examine all potential risks, including liner fatigue, salt saturation in the drilling mud, hole collapse, and damage to the liner top elastomers. Numerous simulations and analyses of torque and drag, pressure, hydraulics, and maximum bending fatigue were conducted to identify the optimal equipment and liner installation depth for the extreme torque and tensile loads expected downhole.

Direct XCD drillable alloy casing bit is specially designed for drilling vertical or tangential wells to TD in one run. It is welded to standard casing or liner that is rotated at the surface. After it has drilled to TD and the liner has been cemented, the bit can be drilled out by any standard PDC bit, which can continue drilling the next interval after drillout is complete, eliminating a dedicated drillout run.

The plan was to install a 9 $\frac{7}{8}$ -in \times 13 $\frac{3}{8}$ -in liner hanger 81 m [280 ft] above the previous one so that the new liner would completely overlap and isolate the previous liner. After running the full 1,198 m [3,930 ft] of 9 $\frac{7}{8}$ -in liner—with a 9 $\frac{7}{8}$ -in \times 10 $\frac{5}{8}$ -in Direct XCD bit on the end—the liner hanger system was made up to the liner and run in hole. Rotation, reciprocation, circulation, and bullheading with 127 m³ [800 bbl] of fluid on each of three occasions were necessary to pass through all the tight spots and reach the previously drilled depth of 5,685 m. Subsequently, 30 m of borehole was drilled with the liner in 3.2 hours to reach the bottom of the salt layer without incident.

Operator saves rig time and avoids sidetracking or abandoning the well

After the successful drilling operation, the running tool was released from the liner hanger system and the liner was cemented with no returns observed at surface. The liner top packer was set and tested to 3,447 kPa [500 psi] with no leaks and the setting tool was pulled out. Subsequently, the shoe track was drilled out with a PDC bit and no further well instability or losses were observed. The operator was able to continue with the original well plan and proceed to the target depth of more than 6,000 m [19,685 ft] with conventional techniques, eliminating the need to sidetrack or abandon the well and saving a minimum of USD 20 million.

slb.com/colossus