

# INNOVERT® OBM & STEELSEAL® LCM Helps Save \$1 Million on First Well in Field

## INNOVERT® OBM & STEELSEAL® LCM HELPS OPERATOR OVERCOME SALT WATER INFLUX, CONCURRENT LOSSES

SAUDI ARABIA

### CHALLENGE

- » Lost circulation, saltwater flows, and the risk of stuck pipe were possible issues on the first well drilled in the Anber field

### SOLUTION

- » INNOVERT® oil-based fluid was selected for its fragile gel behavior and improved equivalent circulating density (ECD) control, and for its low oil/water ratio and tolerance for water flows

### RESULT

- » When the well took an influx that dropped the oil/water ratio from 80/20 to 60/40, the HPOBM remained stable. Concurrent losses were cured by treating the active system with STEELSEAL® LCM

### CHALLENGE

This was the first well drilled in the Anber field. The overall challenge for this well was a narrow pore pressure/fracture gradient window.

The operator had determined that there was a high risk of simultaneously encountering a saltwater flow and lost circulation while drilling through the Mansiyah and Kial formations. This meant an increased potential for stuck pipe due to the change in the mud properties after the saltwater influx.

Further, the difference in pore pressures between the Mansiyah and Kial formations (salt formations with expected saltwater flow) indicated a risk of heavy losses through the layered evaporates (halite and anhydrite) and clastics found in the Kial formation.



**\$1 MILLION**  
SAVED IN RIG TIME

### SOLUTION

To prevent lost circulation and stuck pipe issues, the Baroid team recommended drilling with the clay-free INNOVERT® high performance oil-based mud (HPOBM) system instead of using a conventional HPOBM.

The proposed INNOVERT system was tested under simulated hole conditions, using a FANN® 75 rheometer to ensure that the INNOVERT fluid could tolerate expected temperatures and help minimize fluid invasion into the formation pores.

The fragile gel structure exhibited by the INNOVERT system enhances control of circulating densities, reducing the risk of breaking down the formation. Another benefit of the fluid is its tolerance for low oil/water ratios (OWRs), meaning that the reconditioning time after a water influx can be eliminated. The proposed INNOVERT formulation contained a powerful blend of emulsifiers, rheology modifiers, and high-pressure/high-temperature (HP/HT) filtration control agents to provide excellent fluid stability even in the event of a significant water influx.

While drilling the Ghawas, Mansiyah, and Kial formations with the INNOVERT system, the operator experienced none of the losses or stuck-pipe issues normally associated with drilling operations in these formations.

When a well control event and subsequent lost circulation occurred, 20 ppb of sized STEELSEAL® 100 and STEELSEAL 400 lost circulation materials (LCMs) were incorporated into the active system through Halliburton Drilling, gamma ray (GR), resistivity (RES), and sonic logging-while-drilling (LWD) tools. The pumping rate varied from 700 gpm to 800 gpm, and the bottomhole temperature (BHT) ranged from 190°F (87°C) to 210°F (98°C). The mud weight was increased from 78 pcf to 100 pcf, and the shaker screens varied from 70 mesh to 120 mesh.

The well was killed successfully, and shut-in casing pressure was reduced from 900 psi to 0 psi. The INNOVERT fluid OWR changed from 80/20 to 60/40 with no loss of stability.

### RESULT

The operator reached total depth successfully and was able to complete a comprehensive logging. The operator also saved its coring operation, with 100% recovery and no fluids-related issues.

Additionally, the operator saved rig time on the switch between drilling and completion fluids before running drillstem tests.

Based on a minimum of 2.5 days saved, with a rig rate of approximately US\$300,000 per day, the estimated cost saving for this project was US\$1 million.