

**Case study:** Development well, Gulf of Thailand

# OMNIFLOW DIF and OMNI-LUBE V2 application saves BHA trips and lowers drilling costs by \$600K USD

An operator drilling an 8½-in. section of a deviated development well in the Gulf of Thailand (GoT) anticipated challenges in reaching target depth (TD) without changing the well path.

The planned well had a complex trajectory, including an inclination of 90 degrees to the horizontal reservoir section. Drilling the lateral brought a significant risk of high and erratic spikes in torque and the potential for zone damage with the synthetic-based drill-in fluid (DIF).

The well inclination path could not be changed due to the risk of potential collision with neighboring wells and the pay zone dictating targets.

Given the well's complex trajectory and risk of zone damage, the operator considered this well the most challenging in its field and with the lowest chance of success.

The operator required a fluid solution that would help maintain the inclination path while stabilizing torque and minimizing vibration in the directional drilling and logging tools (MWD/LWD) for longer bit life and fewer bottomhole assembly (BHA) trips.

Baker Hughes proposed its OMNI-LUBE™ V2 lubricant, incorporated into the OMNIFLOW™ invert emulsion drill-in fluid (DIF), to help reduce torque in the BHA to acceptable levels. No other service provider had ever proposed such a solution, making this a first time for the operator to utilize a lubricant in an invert emulsion DIF.

Baker Hughes fluid specialists performed extensive lab testing with several formulations containing

OMNI-LUBE V2 to ensure optimal lubricity and torque reduction, without compromising equivalent circulating density (ECD) or mud flow rate. These test formulations also included the MICRO-WASH™ filter cake breaker system to ensure a minimum of 95% cake removal efficiency.

Baker Hughes reviewed the test results and the historical performance of OMNI-LUBE V2 in other wells with the operator, well ahead of the planned execution in the field. Satisfied with the results, the operator gave the go-ahead to proceed with the OMNI-LUBE V2 formulation to drill the challenging reservoir section.

## Successfully saving time and tools to TD

An OMNIFLOW DIF, weighted with marble-grade calcium carbonate, was prepared to drill the reservoir section. Directional drilling of the 8½-in. horizontal section continued with a 9.4-ppg OMNIFLOW DIF, with torque and tool vibration continuously monitored to check for erratic measurements or spikes. Because of concerns related to hole cleaning while drilling, a low-viscosity/high-weight sweep was pumped at a measured depth (MD) of 8,010 ft, resulting in a 30% increase in cuttings at the shakers.

The drilling team observed excessive and erratic torque and tool vibration in the same area, prompting the addition of the OMNI-LUBE V2 formulation at a concentration of 3% v/v in the active OMNIFLOW system at a MD of 8,100 ft.

Once the OMNI-LUBE V2 formulation circulated out of the bit, the drill team

## Challenges

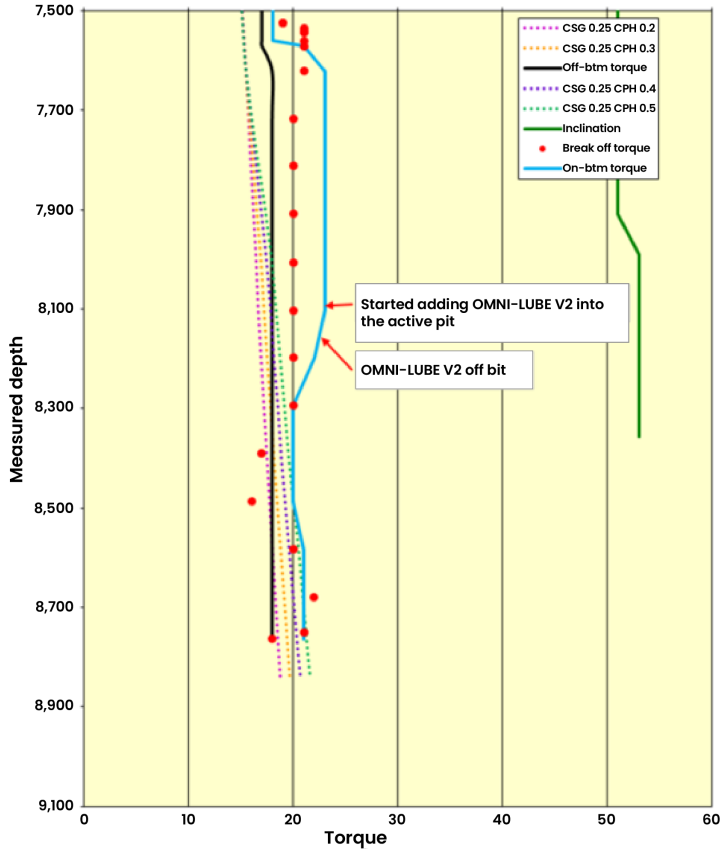
- Open hole with complex trajectory – 90° inclination
- Horizontal section with high, erratic torque spikes that challenge directional drilling
- A need to keep well inclination path constant due to potential collision with other wells and pay zone dictating targets

## Results

- Avoided an extra trip and the need to reconfigure directional drilling parameters, saving \$600K USD
- Stabilized erratic torque and MWD/LWD tool vibration
- Observed a 31% increase in rate of penetration due to improved OBM lubricity
- Reduced average torque pick by 10%

observed a significant reduction in erratic torque and MWD/LWD tool vibration. Drilling with the OMNI-LUBE V2 as part of the OBM improved fluid lubricity, allowing the drill team to reach TD with an average 31% higher rate of penetration (ROP) without compromising well trajectory or extending drilling time. The MICRO-WASH system was then applied to remove the RDIF filter cake and prepare the reservoir for production.

The operator considered this first trial of a contingency lubricant in an invert emulsion DIF a success. By successfully drilling this challenging horizontal reservoir section to TD, without an additional BHA trip or the risk of losing a BHA in the well, the operator saved an estimated \$600,000 USD in drilling costs related to tripping time and change-outs or repairs to directional tools in the BHA.



Torque values started increasing at the BHA at greater drilling MD but adding OMNI-LUBE V2 quickly brought torque values back down to acceptable levels.