Case study: Wushi oilfield, South China Sea

First FASTrak HD service in China improved efficiency, saved 14 hours rig time

A major operator in the Wushi oilfield of the South China Sea wanted to confirm mobility, fluid type and secure representative fluid samples in low permeability reservoir layers. The fluid analysis data would be used to assist the production strategy of offset wells in the area where similar oil properties were expected.

The conventional approach to formation testing and sampling was to deploy wireline technology, which had historically resulted in poor sealing efficiency and stuck tools, due to time-dependent borehole instability.

The operator planned to access the reservoir layers by drilling a deviated well using water-based mud with a 1.45 g/cc mud weight despite a further risk of differential sticking.

The range of reservoir properties (porosity from 8 to 18 pu and permeability estimates from 0.5 to 57 mD) indicated tight-to-low permeability reservoirs.

In order to mitigate these known risks and acquire formation fluid samples with minimal delay in delivering the well, Baker Hughes proposed the **FASTrak™ HD fluid analysis sampling and testing-while-drilling service**. This technology allows the drillers to maintain well control during the fluid sampling operation. It also enables efficient cleanup and sampling at 8 cc/s in 10 mD/cP mobility using the large flow-area probe configuration.

As expected, the overbalance exceeded 2,000 psi (13,790 kPa) and extended cleanup had to be performed before samples could be collected.

The maximum cleanup time was 4-½ hours prior to collecting 1.5 L (0.4 gal) of reservoir oil samples into single phase tanks (SPT). The total sample volume was 2.9 L (0.8 gal) inclusive of four samples from two depths. The samples were analyzed at the wellsite and found to be satisfactory as per customer's objectives (< 10% contamination for the priority samples).

A pad seal efficiency of 100% was achieved during the job, a rare accomplishment in the area.

The job was jointly monitored in real time by Baker Hughes technical experts and customer's logging supervisors using the **WellLink™ RT remote visualization and collaboration service**. Custom plots were used by various monitoring teams, enabling quicker communication and faster decisions.

The operator was very impressed with the Baker Hughes solution and will consider the latest generation of the FASTrak Prism service for future jobs.

Baker Hughes engineers prepare the FASTrak HD service sample tanks.

Challenges

- Collect high quality samples in low porosity and low permeability environment
- NPT due to differential sticking risk in high overbalance environment
- History of stuck wireline tools and poor pad seal efficiency due to rugose borehole

Results

- Achieved successful pressure testing, reservoir fluid identification, and sampling in very low mobility sands
- Completed the operation in a single run, saving 14 hours of rig time
- Achieved 100% pad seal efficiency
- Experienced no nonproductive time (NPT)