

FTeX service successfully mapped the pressure profile in chalk

An operator of a major North Sea field needed to acquire formation pressure to map the pressure profile through the chalk section. This information was key to the operator and the timeline for execution was critical.

Measuring formation pressure through chalk has been a significant industry challenge because chalk has extremely low permeability properties, and it is typically assumed that chalk cannot be pressure tested accurately. The **FTeX™ advanced wireline formation pressure testing service**, from Baker Hughes, a GE company (BHGE), was selected for this operation, with the key objective of mapping the pressure profile through this low porosity, extremely low mobility chalk section. The tool not only had to acquire formation pressures but also had to verify them by achieving stable repeat pressures.

The operator collaborated with BHGE to custom-design a packer with three times the normal surface area to expedite the operation. The pressure points were chosen from a previous imaging run and real-time Pressure Transient Analysis (PTA) was performed to validate the formation response on pressure points.

The patented **Formation Rate Analysis™ (FRA™) technique** was used to calculate mobility. Unlike drawdown mobility, the FRA technique accounts for the storage effects and calculates the correct formation flow rate, which is critically important in mobility estimation in low permeability zones.

Valid, repeat pressures were acquired from 16 depth stations with 12 tests achieving a build-up stability of less than 1 psi/min, with the lowest being 0.01 psi/min.

A stable pressure measurement was recorded at mobility as low as 0.003 mD/cP with 0.9 psi/min stability and repeat tests within 30 minutes. The mobility data for the operation ranged from 0.003 to 0.4 mD/cP. The electrical pump of the FTeX service was able to achieve drawdown rates as low as 0.002 cc/sec, which was the key to success at such low mobility.

Using the custom-made elongated packer reduced the test time by 50% compared to a standard probe deployed in a previous well at same mobilities. The FTeX service acquired valid, repeatable pressure measurements and successfully mapped the pressure profile through the chalk section.

Challenges

- Extremely low mobility chalk formation
- Validate the profile by acquiring stable, repeat pressure measurements
- Mitigate tool storage effects in low mobility environment
- Determine mobility accurately

Results

- Successfully mapped the pressure profile
- Acquired valid, repeatable formation pressures through chalk
 - Recorded stable pressure measurement at mobility as low as 0.003 mD/cP with 0.9 psi/min stability and repeated tests within 30 minutes
 - Achieved drawdown rates as low as 0.002 cc/sec
- Mitigated tool storage confusion by validating formation response with real-time PTA analysis

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