

Case study: Norway

# Automated fluids monitoring service enables rapid barite sag detection to avoid hours of NPT

A major operator in the North Sea faced serious barite sagging challenges while drilling with an invert emulsion fluid (IEF) system.

The IEF system was lab tested against many risks—barite sagging included—prior to developing the final fluid program. While the IEF system’s rheology remained in-spec during dynamic conditions, it could not withstand prolonged static conditions at high temperatures and pressures downhole. These conditions eventually caused the barite to sag or drop out of the IEF system, leading to out-of-spec mud weight and rheology and potential plugging of the string.

The operator asked Baker Hughes to develop an early warning solution to identify the onset of barite sagging. This would allow the drilling team in the remote center to detect slight changes to mud weight much faster than is possible for a rig crew relying on less frequent manual checks. Without early detection and quick action, the level of barite sag would make remediating the fluid properties much more challenging—requiring long circulation times and increasing the risk of stuck drillstring.

## Developing an automated monitoring solution

Baker Hughes proposed its **i-Trak™ automated fluids monitoring service**, utilizing the **i-Trak™ automated fluids monitoring unit (AFM)** for continuous monitoring of fluid and drilling parameters combined with automated analysis and real-time, expert technical support.

The AFM service automatically detects the slightest mud weight trends with greater speed and precision than is possible using manual methods.

These measurements are automatically analyzed and transmitted to remote Baker Hughes fluids experts tasked with actively monitoring the fluid properties and other key drilling parameters. These remote fluid engineers verify the data by comparing it to manual rheology and mud weight data recordings submitted by the rig crew. Once verified, the data are used to engineer any necessary adjustments to the fluid system. These findings and recommendations are then immediately relayed to the client. Once these recommendations are approved, the AFM service guides the rigsite personnel to make the necessary adjustments to avoid barite sagging and maintain optimal safety and performance.

## Maintaining fluids specifications

The real-time monitoring and automated analysis provided by i-Trak AFM service identified variations in mud weight sooner, giving the onshore team an early indication of barite sagging.

Prior to implementing the AFM service, rig personnel evaluated fluid rheology and density data every six hours. This significant time delay under these conditions would have allowed barite sag issues to progress to the point of that lengthy fluid recovery actions to avoid potential plugging of the drillstring. The AFM service compared

## Challenges

- Barite sagging risks due to:
  - prolonged tripping operations
  - extended static conditions
  - reduced circulating rates
- High risk of NPT due to barite-induced string plugging

## Results

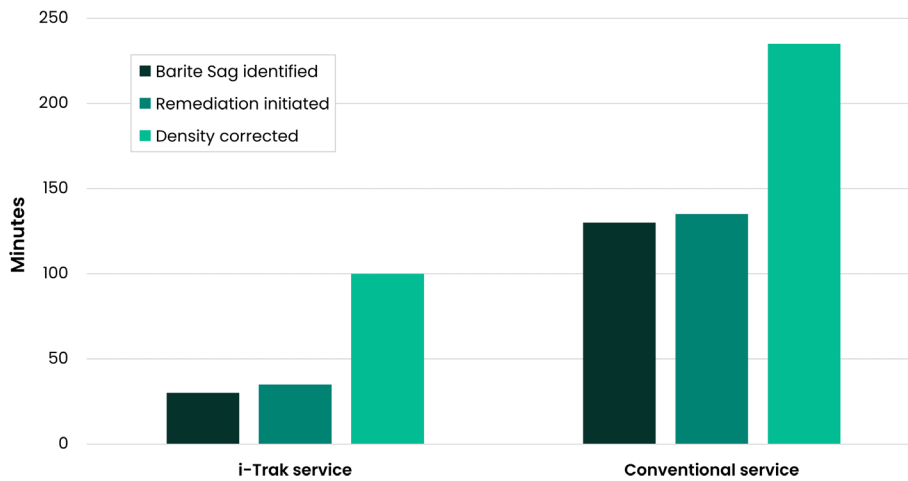
- Reduced time to identify barite sag or changes in mud weight
- Minimized NPT by avoiding string plugging and long circulation times
- Aided remote operations to maintain specified mud weight and avoid additional barite sagging

the live mud weight and rheological data with manual checks at 15-minute intervals, a significant time savings that prevented barite sag issues from becoming a larger problem.

The service provides this real-time data to all key wellsite personnel on the drilling job, the onshore fluids team, and other support personnel in the office.

The fluids team applied the mud remedies required to maintain mud weight and rheology per specs. By reducing the time to identify the onset of sagging, the service also guided the fluids team on the right course of action to treat the fluid early and avoid long hours of circulation time typically required to remediate a barite sagging problem.

### Barite sag identification and remediation i-Trak AFM vs. Conventional service



The i-Trak automated fluids monitoring service identified barite sag within 30 minutes of its first occurrence. This allowed the drilling team to take corrective actions and eliminate the issue faster than the sag problem could even be identified using conventional methods.