Case Study: REALology Intelligent Drilling Fluids Monitoring System

Advanced Real-Time Monitoring of Drilling Fluids in Deepwater Operations

OVERVIEW

In the challenging environment of deepwater drilling, operators face numerous technical obstacles that can significantly impact drilling performance and safety. One of the most critical aspects of these operations is the effective management of drilling fluids, which play a pivotal role in maintaining hole stability, drilling efficiency, and reservoir protection. However, traditional methods of monitoring drilling fluids, relying heavily on manual tests and often plagued by delays and inaccuracies, have proven inadequate in demanding deepwater conditions.

The case study showcases a deepwater drilling platform operated by one of the giant operators in China. The platform planned to drill 3 exploration wells, each designed to total depths of approximately 5,000 meters, utilizing both water-based and oil-based drilling fluid systems. These wells faced formidable challenges, including fluid loss, high temperatures, and must focus on reservoir protection.

CHALLENGES

- **Limited Space**

  Deployment of monitoring equipment was constrained by the limited space of only about 2 m² available on the drilling platform.

- **Harsh Operating Conditions**

  The monitoring equipment must be resilient to high temperatures, humidity, and salinity, demanding exceptional durability and reliability.

- **Continuous High-Frequency Monitoring**

  The necessity for prolonged operational uptime and frequent data collection posed a challenge to the stability and performance of monitoring equipment.

- **Well Control Risks**

  Since the high challenges on fluids loss and possible kicks according to drilling fluids design, well control is critical to successful operation, close monitoring of drilling fluids properties is one of the key methods to prevent downhole problems.

SOLUTIONS

To address these challenges, Vertechs successfully deployed two REALology units to provide continuous monitoring of critical drilling fluids parameters, including viscosity, density, pH, and chlorides, at both the inlet and outlet of the circulation system. This approach allows for real-time adjustments based on fluid properties.

Fig1. Vertechs REALology is deployed in a confined & limited space on the drilling platform.

- **Real-Time Data Acquisition**

  The REALology provided continuous, real-time data on drilling fluid properties, enabling immediate detection of any abnormal fluctuations.

- **Enhanced Analytical Capabilities**

  This data empowers operators to effectively assess complex downhole conditions, facilitating better reservoir protection and avoiding downhole hazards.

- **Early Warning System**

  The ability to rapidly identify potential downhole issues allowed for proactive measures to be taken, minimizing NPT (non-productive time) and ensuring downhole safety.

ACCURACY COMPARISON

Vertechs compared the manual test data from an experienced drilling fluid engineer against the REALology system to verify the deviation of the fluid test results.

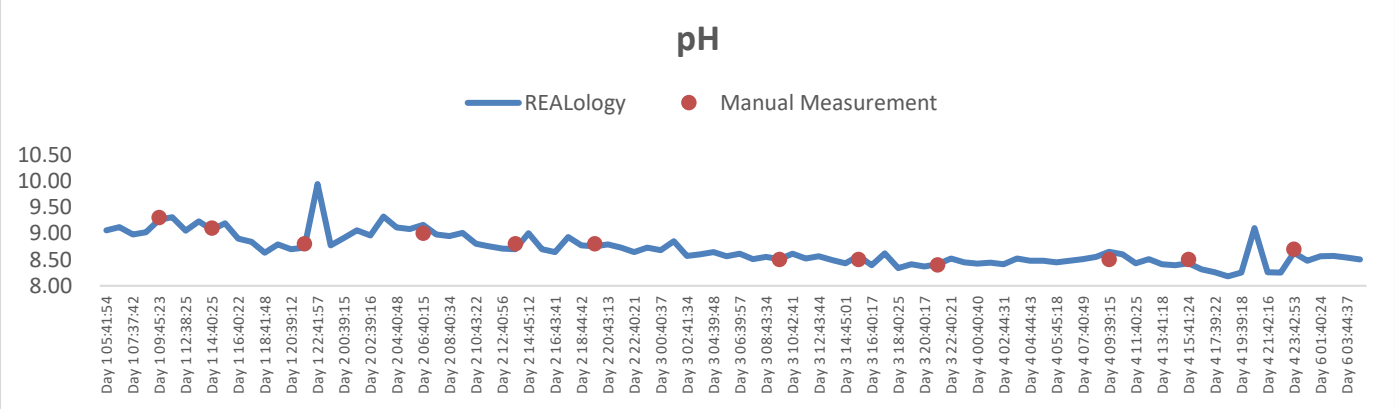

Fig2. Data indicates close trends between REALology and manual measurement data collation.

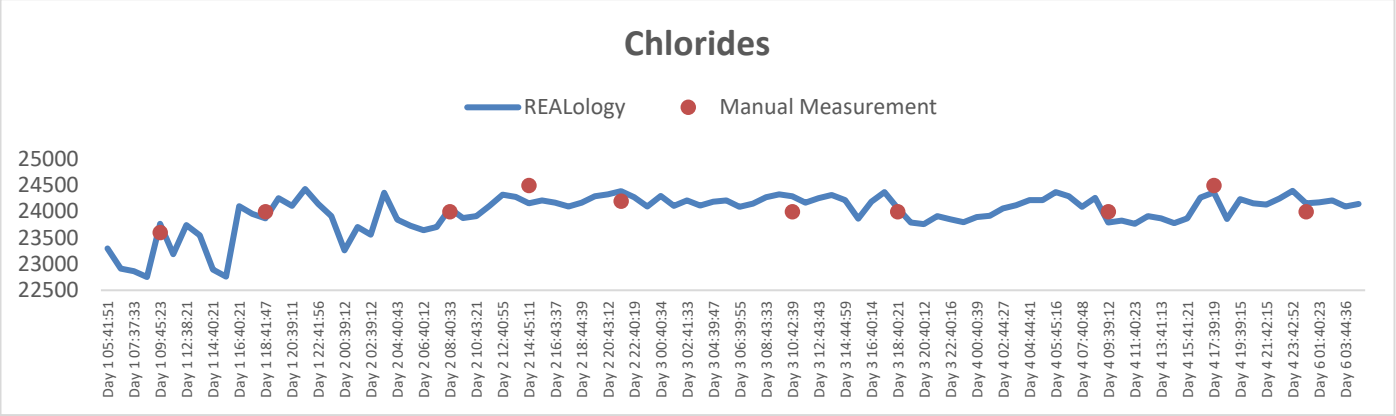

Fig3. Result indicates deviation between REALology and manual measurement data < 3%

RESULTS

The deployment of REALology's advanced monitoring solution has transformed drilling operations, enhancing efficiency and significantly reducing risks associated with fluid quality. This case study highlights the impact of innovative technologies in optimizing performance and decision-making in challenging offshore deepwater environments.

- **24/7 Continuous Monitoring**

  All wells were monitored in real-time across entire drilling sections, significantly improving the accuracy and responsiveness of fluid performance data.

- **Automated Data Processing**

  The automation of data analysis minimized manual intervention, reducing errors and enhancing overall operational efficiency.

- **Comprehensive Data Logging**

  Continuous measurements provided a complete historical record, enabling thorough analysis of downhole conditions and fluid performance variations.