

# STAR HIB<sup>®</sup> PLUS

## Inhibitive Water-Based Drilling Fluid System Used to Drill High-Temperature, High-Pressure Gas Well

### CHALLENGE

An Indonesian operator set out to drill a gas well in an area with limited field data available. Initial plans called for drilling the 12 1/4-in. and 8 1/2-in. sections using synthetic-based drilling fluid (SBM) to address anticipated challenges posed by highly reactive shales and high-pressure, high-temperature (HPHT) conditions. However, the potential use of SBM raised environmental and cost concerns.

### SOLUTION

Seeking a technical, effective, and environmentally-minded drilling fluid solution, Impact Fluid Solutions collaborated with PT Tiga Ombak and a local Indonesian company to develop a High-Performance Water-Based Mud (HPWBM) system, primarily formulated with STAR HIB PLUS as the shale inhibitor. The team conducted extensive lab tests using various shale inhibitors, including sample cuttings to mimic contamination. STAR HIB PLUS emerged as the most effective solution, as the HPWBM system exhibited exceptional performance. Consequently, PERTAMINA Zone-1, the well's operator, approved the HPWBM system to replace SBM for drilling the 12 1/4-in. and 8 1/2-in. sections.

In addition to reactive and unstable shales, more challenges arose once drilling began including high gas readings and partial downhole losses. It became critical to balance the mud weight to manage gas influx risks and avoid exacerbating losses.

During the drilling of the 12 1/4-in. section, a HPHT polymer additive was deployed to enhance the stability of the mud system. Incorporating approximately 3% potassium chloride (KCl) and a 3–4% concentration of STAR HIB PLUS contributed to superior shale inhibition. There were no reports of cutting issues, hole instability or bit balling throughout the section. The treated HPWBM system was used in the subsequent drilling of the 8-1/2-in. section, with more challenging conditions such as higher bottom hole temperature (370° F/188° C) and significantly higher formation pressure (over 7,000 psi) requiring 1.85 SG (13.2 lb/gal) density.

### RESULTS

Hole stability was maintained without any issue despite the challenging conditions and the open hole being exposed for over 20 days during well control and lost circulation mitigation operations. The STAR HIB PLUS-based HPWBM system not only enabled effective shale inhibition in a challenging drilling environment, but also cut the operator's costs significantly. For example, the typical non-productive time associated with HPHT conditions and prolonged shale exposure was eliminated. This custom-developed system also provided impressive cost-efficiency, reducing the operator's drilling fluid expenses by approximately 50% compared with using an SBM, including associated losses.



### CHALLENGE:

- ▶ Unusual gas well with limited field data
- ▶ Reactive shales and high-pressure, high-temperature conditions
- ▶ Plan to use synthetic-based drilling fluid raised environmental and cost concerns

### SOLUTION:

- ▶ Developed High-Performance Water-Based Mud system using STAR HIB PLUS
- ▶ Extensive lab testing indicated STAR HIB PLUS was ideal solution to manage contamination and well-specific challenges
- ▶ Used HPHT additives and a mixture of potassium chloride and STAR HIB PLUS for enhanced shale inhibition.

### RESULT:

- ▶ Maintained wellbore stability amid challenging drilling conditions and shale reactivity
- ▶ Delivered outstanding technical performance, minimizing nonproductive time in HPHT conditions, along with environmental advantages
- ▶ Reduced drilling fluid expenses by 50% compared with using synthetic-based mud.

**STAR HIB<sup>®</sup> Plus**  
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