Managed Pressure Drilling Service Cuts Drilling Costs 50% in Challenging Ultrahigh-Temperature Wells

@balance services mitigates NPT, saves 20 days and USD 5 million in Gulf of Thailand

**CHALLENGE**
Drill through narrow mud-weight windows and formation pressure uncertainties to reach TD in ultrahigh-temperature (ultraHT) offshore wells while keeping nonproductive time (NPT) to a minimum.

**SOLUTION**
Implement @balance managed pressure drilling services to successfully complete the wells.

**RESULTS**
- Successfully drilled section with no ballooning and extreme thermal effects on bottomhole pressure.
- Efficiently killed wells, allowing for wireline logging.
- Saved 20 days of drilling time and reduced well costs by USD 5 million or 50%.

An operator in the Gulf of Thailand faced costly challenges while conventionally drilling two ultraHT wells that reached temperature gradients up to 428 degF (220 degC). In the ultraHT sections, the operator encountered serious ballooning issues that resulted in severe NPT and difficulty reaching TD. Narrow mud-weight windows and formation pressure uncertainties posed additional drilling challenges.

**@balance services overcome ultraHT drilling challenges**
The operator decided to utilize M-I SWACO @balance managed pressure drilling services to overcome the ultraHT obstacles and drill the challenging wells to TD. The strategy involved designing a hydrostatically underbalanced mud weight to enable optimal drilling rates. The service was used to continuously maintain bottomhole pressure (BHP) above pore pressure. The service was also used to safely identify the formation pressures by performing static flow checks. Dynamic formation integrity tests and leak-off tests conducted while drilling accurately identified the losses limit and ballooning gradient. Additionally, special rollover procedures were implemented to maintain control of the well and to safely pull out of hole, taking into account extreme thermal effects on BHP reduction.

**Wells successfully drilled with significant cost savings**
By implementing @balance services, both wells were drilled successfully without encountering any wellbore issues. The operator was able to drill through narrow windows and avoid issues associated with ultraHT conditions, including ballooning and extreme thermal effects on BHP. Moreover, @balance services allowed the operator to drill efficiently and safely identify the drilling window to establish boundaries. As a result, the operator cut costs by 50%, a total of USD 5 million, and saved 20 days of drilling time.
The field has tight reservoirs, making the observation of inflow during the flow-check difficult. Therefore, two static flow checks were performed and combined to minimize the number of bottom-up circulations required to check for the connection gas to evaluate the actual formation pressure.

Dynamic leak-off testing was conducted while drilling to improve drilling efficiency. Minimal losses were observed, and the upper-limit drilling boundary was identified in the ultraHT section.

*Mark of M-I L.L.C. © 2015 M-I L.L.C. All rights reserved. 15-MS-0013