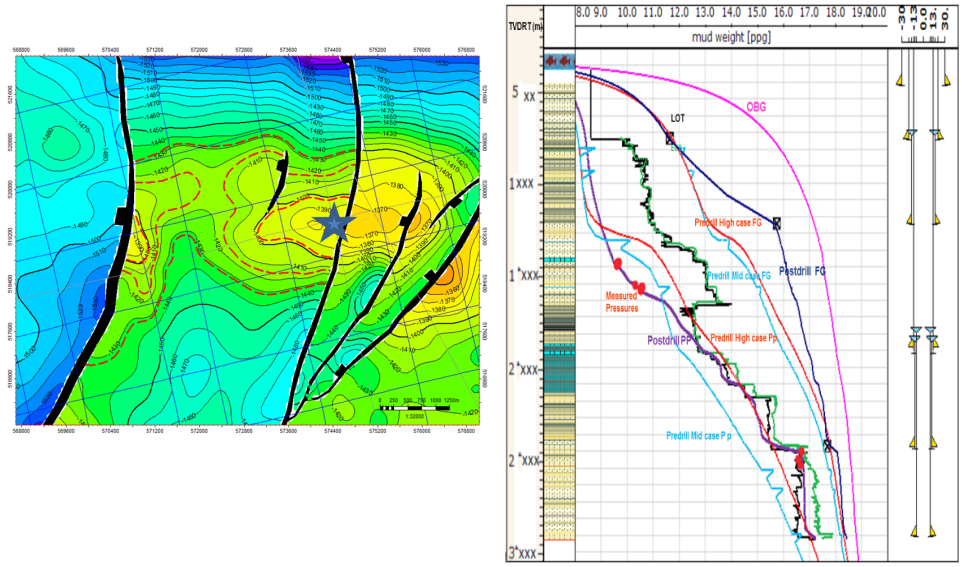
LOCATION: OFFSHORE ASIA PACIFIC REGION

RiskGuard Pressure solution delivered an HP/HT well in a previously inaccessible reservoir



The RiskGuard Pressure solution enabled the successful drilling of what was considered by many to be an impossible well.

In 1974 an operator was drilling an HP/HT wildcat well in a new block located in the South China Sea when it experienced a severe kick that put the crew and the entire operation at unacceptable risk. The operator was able to regain well control, but it was forced to sidetrack the well. The incident was so severe that the operator made the decision to suspend any future wells in the block.

Forty years later, there were still no new wells in the area. The risk of an underground blowout was deemed too great, not to mention the cost of having to deal with lost circulation, differential sticking, reduced rates of penetration (ROP), and reservoir damage typical in HP/HT wells, even if the pressure can be controlled.

Where all other service providers saw a roadblock, Baker Hughes, a GE company (BHGE), recognized an opportunity. Based on recent successes achieved by combining our reservoir insight (subsurface experience), integrated pre-drill modeling workflows, and real-time monitoring—what we now refer to as the **RiskGuard™ analysis and risk management solution**—the BHGE Asia Pacific team approached the operator with a plan.

Results

- Successfully evaluated a previously inaccessible reservoir
- Delivered an HP/HT wildcat well in adverse conditions

Challenges

- Less-explored block with very little geological information and data
- Most recent nearby well was drilled in 1974, and experienced a severe kick
- Standard real-time pore pressure monitoring insufficient for success

BHGE solution

- Produced a RiskGuard geomechanics-based operational assessment to serve as a basis for well design and the mud weight plan
- Used RiskGuard Pressure solution to make ongoing adjustments based on pore pressure data, real-time geomechanical analysis, and regional experience

The BHGE team collected data from three wells in adjacent blocks, two of which were drilled in different geologic settings, and one with a similar clastic-dominated geology that was miles away. The nearest well—the one involved in the incident in 1974—had limited information. However, it was clear that predicting pore pressure would be a challenge due to multiple overpressure-generating mechanisms, an absence of calibration data, and the poor quality of existing seismic velocities. Where the data was lacking, BHGE filled the gaps by utilizing the regional database built over the years by working with multiple operators

Combining experience and known data, the BHGE team produced a RiskGuard geomechanics-based operational assessment—the first phase in any RiskGuard solution—which identified each specific risk, developed a strategy to manage it that included real-time monitoring, and assembled the appropriate technologies for execution. With the operational assessment in hand, the operator developed its well design and mud weight plan.

The operator elected to drill two wells based on the assessment provided by BHGE. The Baker Hughes team would support one well with the **RiskGuard Pressure solution**—which includes experienced personnel that can monitor pore pressure, conduct ongoing geomechanical analysis, and actively control wellbore stability in real time. The second well would be supported by a competing service provider. The competing service provider on the second well focused solely on real-time pore pressure evaluation, as is typical even in HP/HT wells. The result was a failure to reach well objectives due to pressure-related complications.

By contrast, the BHGE team applied the RiskGuard Pressure solution and made ongoing adjustments based not only on pore pressure data, but also on real-time geomechanical analysis and regional experience. This integrated approach delivered a well that was drilled according to plan without excessive nonproductive time (NPT) or invisible loss time (ILT) in a geology that had not been tested since 1974. The RiskGuard Pressure solution enabled the successful drilling of what was considered by many to be an impossible well.

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