MI SWACO
A Schlumberger Company

Operator Increases Drilling Rate and Efficiency in Horizontal Development Project in Gulf of Thailand

THE SITUATION

Increase drilling efficiency, improve wellbore stability, eliminate lost circulation, and increase on bottom drill time while drilling high angle and horizontal wells through unstable coal seams and depleted gas sands in mature offshore eld.

THE SOLUTION

Install the dynamic annular pressure control (DAPC) system and the HOLD rotating control device (RCD) to enable drilling with statically underbalanced mud, relative to wellbore stability, and constant ECD even during dynamic transitions when the rig pumps are turned off.

THE RESULTS

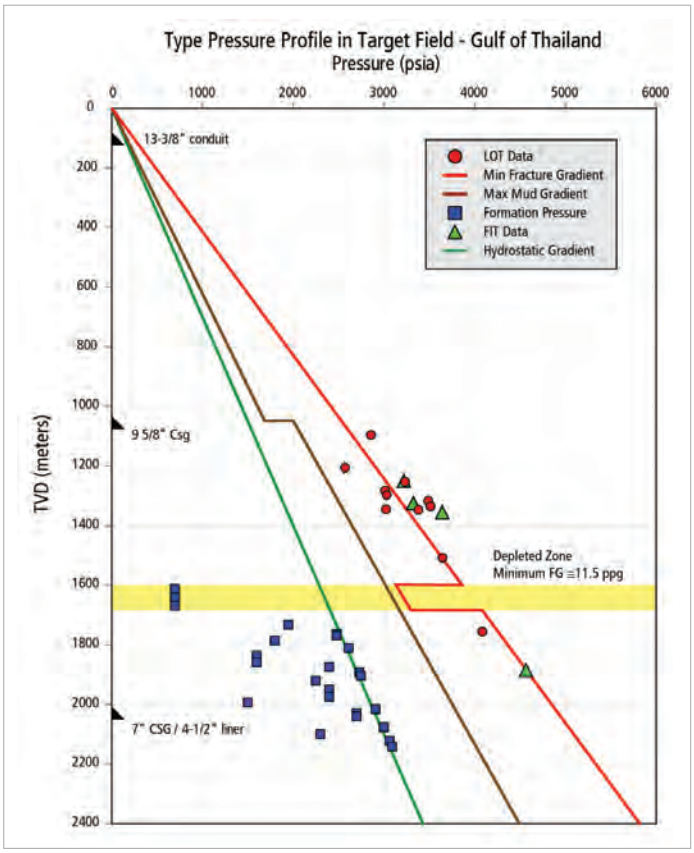
The DAPC system controlled the BHP within a narrow window of +/- 0.12 ppg during connections and bit trips. Constant BHP helped avoid losses, preserve wellbore stability, and increase drilling efficiency. The DAPC system contributed to increased drill rates and cost savings of over USD 3 million.

MPD enables mud weight and ECD reduction, reduced non-productive time, and increased drilling efficiency in Gulf of Thailand development project

Eliminating losses

In their development of the Bunga Kekwa field in the Gulf of Thailand, Talisman has drilled 14 wells with the DAPC system and improved their efficiency with faster drilling and less NPT. The key drilling objectives were to improve efficiency in high angle wells drilled through depleted gas sands and unstable coal seams and shale, avoid losses, improve stability and hole cleaning, and reduce non-productive time.

Previously used conventional methods to accomplish these objectives significantly increased NPT and were ineffective at managing ECD and preventing losses.

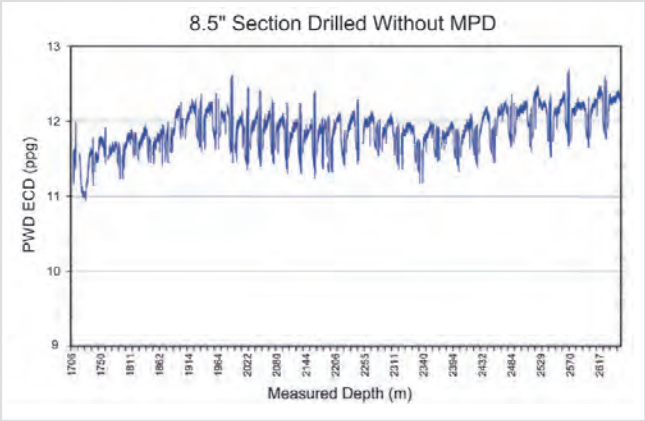


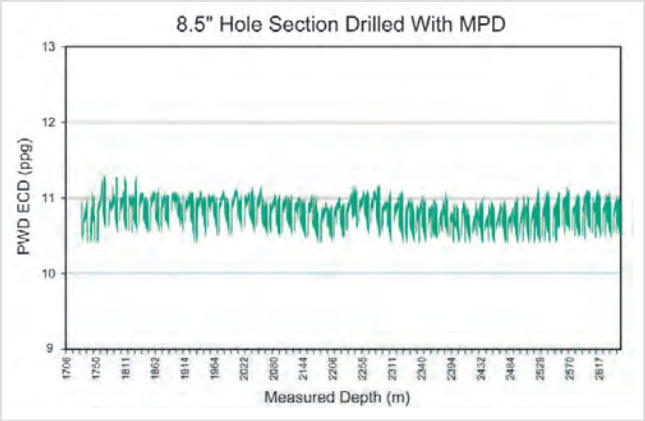
Reducing mud weight and ECD

Relying on the DAPC system to manage constant BHP during steady state and dynamic transitions allowed Talisman to reduce the MW by 1.2 ppg, from 10.2 to 9.0 ppg, ECD from 12.3 to 10.2 ppg, and stabilize the wellbore. Talisman was able to improve mud rheology, reduce solids, increase the flow rate and improve ECD management, hole cleaning and drilling rates.

The chart below left is a record of actual PWD BHP in the upper section of an 8½-in hole drilled with 10.2 ppg mud, without MPD. The ECD varied unmanageably from 11 ppg at the start of the section to 12.3 ppg at the end with noticeable effects of swab and surge during connections.

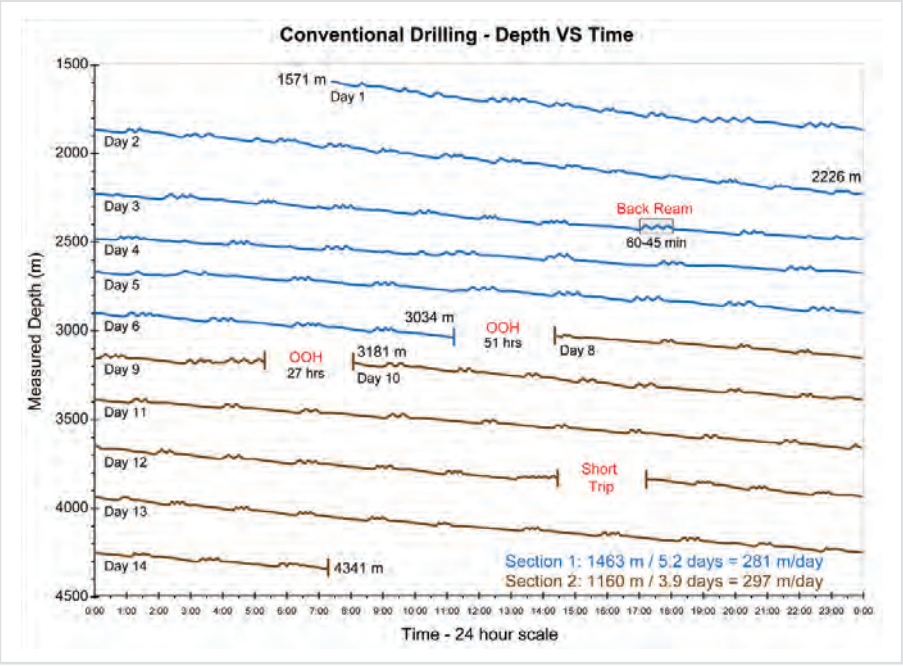
The chart below right is a record of actual PWD BHP in the lower section of an 8½-in hole drilled with MPD and 9.0 ppg mud. The ECD was constant at or below 10.0 ppg with reduced swab and surge effects.

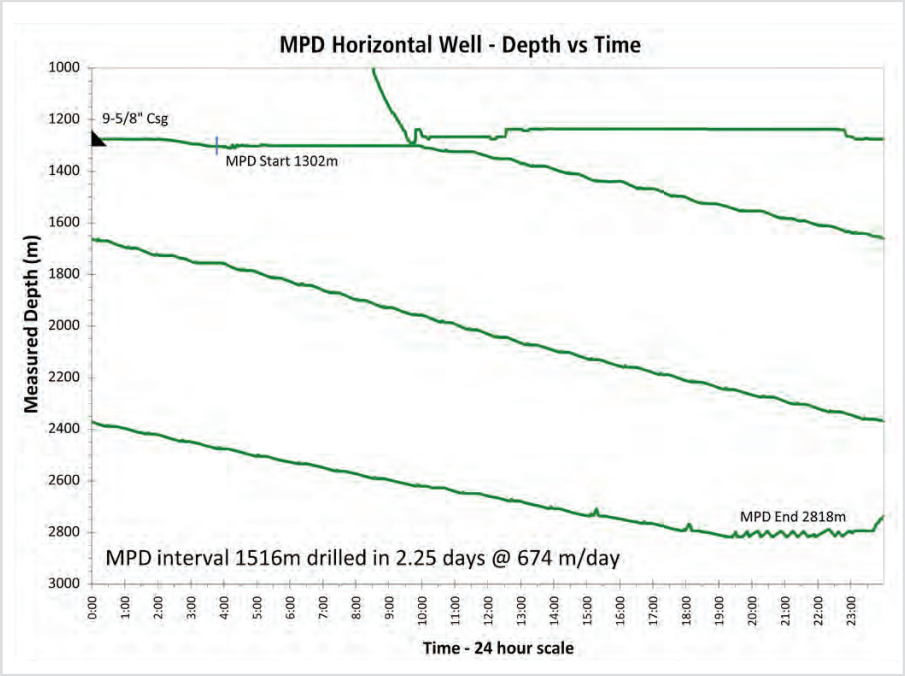




Reducing NPT and increasing average drill rate

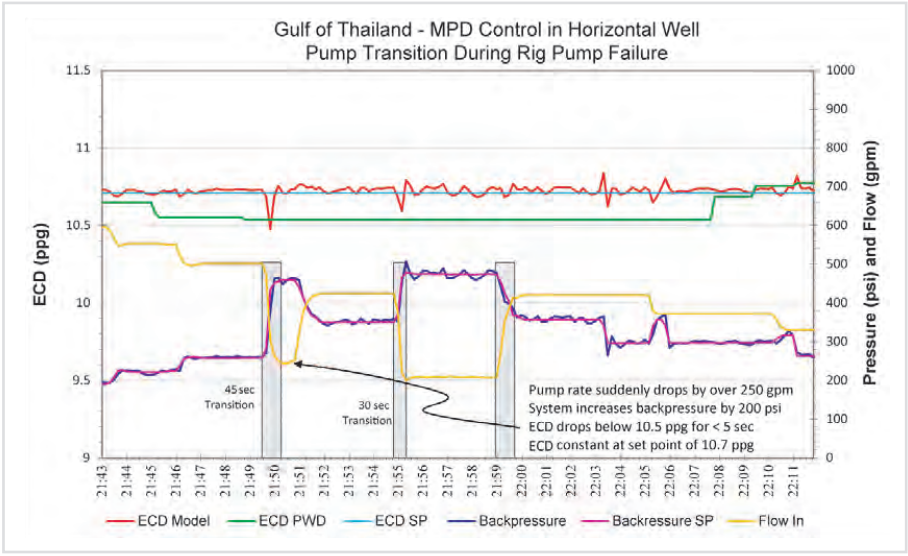
An offset well (below) was used for model calibration and drill time benchmarking. The average drill rate in the 8½-in section was 275 m/day. In the offset reference well, Talisman spent over 2.5 days of non-productive time trying to manage ECD by back reaming, short trips, and bottoms-up circulation, the cost of which was over USD 800,000. In the first three wells drilled with the DAPC system, Talisman saved over 4 days of drill time equal to over USD 1.5 million. In the seventh MPD well (top of next page), the daily drill rate was 674 m/day, representing an average drill rate improvement of nearly 1.5 times greater.





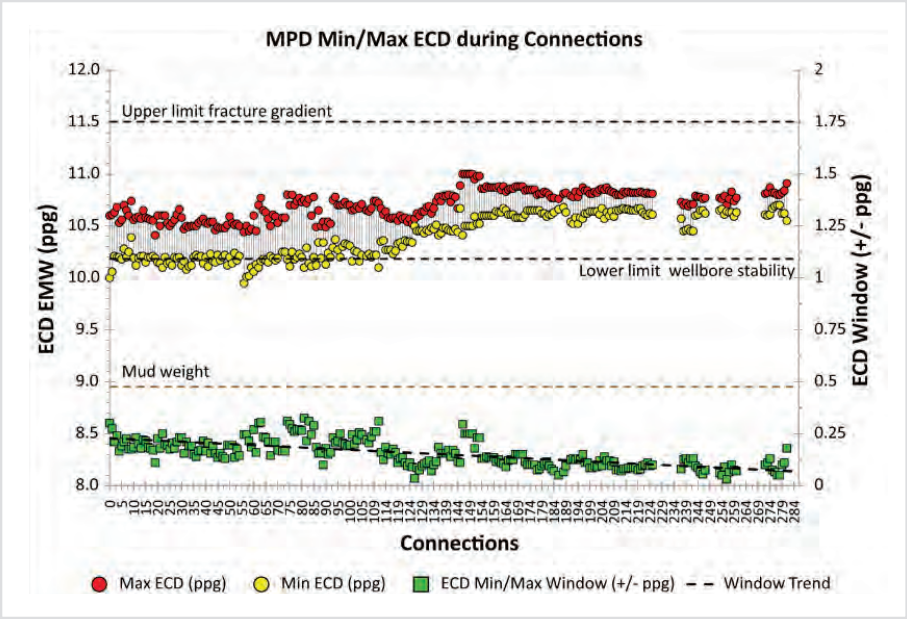
Rapid response and constant BHP during pump failure

During one well, one of the rig pumps went down and 20 gpm of flow into the well was suddenly lost. The DAPC system automatically responded by increasing the backpressure by 200 psi. The second pump rate was increased to compensate during which time the system responded by reducing the backpressure. Through the initial pump failure, the real-time model calculated the drop in ECD to be about 10.5 ppg for a very short time, less than 5 seconds. During subsequent flow rate adjustments the system automatically responded by increasing and decreasing the backpressure as needed to hold the ECD at the set point.



Measurable control performance

Measuring the magnitude of the pressure fluctuations during any transition is a way to assess the MPD system's ability to manage the ECD within a specified window. A partial summary of the minimum and maximum pressure fluctuations for 285 connections is plotted to the right. It shows the average window in which the BHP was controlled by the MPD system between 2007 and 2009. The average min/max window was +/- 0.25 ppg at the start and between +/- 0.12 and 0.15 ppg at the end of this phase of the project and reflects considerable improvement in ECD management.



Increasing production and reducing drilling costs

In the 14 wells Talisman drilled with statically underbalanced mud and the DAPC system, they have saved over USD 3 million through drilling efficiency improvements.

M-I SWACO
A Schlumberger Company

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P.O. Box 42842
Houston, Texas 77242-2842
www.miswaco.slb.com
Email: questions@miswaco.slb.com