Milling and reaming: Opening many "windows of opportunity"

IADC/SPE 59237

Milling Variable Window Openings for Sidetracking

This paper presents a unique whipstock design and milling tool design, the combined performance of which produces a full gage window opening of up to 85% of the total window length and thereby provides an abundant clearance for drilling assemblies and liner completions. Test conducted on 7-in./29-lb/ft casing resulted in a total window opening of 9.8 ft (118 in.), out of which 7.5 ft (90 in.) was a full gage 6.00-in. opening. Test on 9 5/8-in.-47 lb/ft casing produced 16.83 ft total window length, of which 14.50 ft measured full gage width of 8.50 in.

The whipstock can easily be modified to produce the desired length of full gage opening.

The benefits of longer full gage window are trouble-free entries and reentries through the window for drilling and completion of lateral; ideal for short radius departure; allows sidetracking in hard formation without drilling rat hole; compensates for any mismatch in depth tally calculations; and eliminates problems associated with skewed window.

—P C Desai and C H Dewey, Smith Drilling & Completions

IADC/SPE 59239: New bi-center bits can drill out and then continue to drill ahead. ROP, directional control, and hole quality have improved. 3 field tests in the deepwater Gulf of Mexico have saved $560,000 in trip costs.

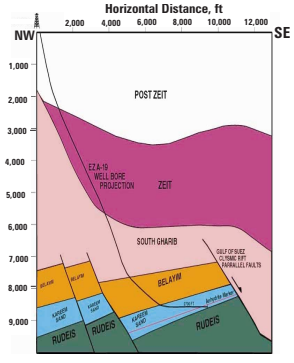
IADC/SPE 59238

Eccentric Tool Increases Liner Size Capacity in Challenging Salt Dome Application Allowing Longest Horizontal Well in Gulf of Suez

This paper describes the use of eccentric tools to solve a variety of complex downhole problems associated with drilling through a salt diaper in the Gulf of Suez. The tool allows simultaneous reaming and drilling with steerable assemblies (SRWD).

The technology was applied in two intervals on well A-19, East Zeit Bay Field, to eliminate hole problems caused on the previous well by salt mobilization and salt water flows. On well A-19, the operator had to strike a balance between using a larger casing string or SRWD tool to drill the well at the most economic cost per foot. Problems involved were large salt sections, possible saltwater flows, interbeded hard limestone/anhydrite sections and an aggressive directional wellbore design.

IADC/SPE 59238: Eccentric tools solved a variety of complex downhole problems associated with drilling through a salt diaper in the Gulf of Suez. The tool allows simultaneous reaming and drilling with steerable assemblies (SRWD).



Without SRWD technology, the operator would have needed a larger casing string design that would have increase the volume of mud required and decreased penetration rates..

—W J Billman, Ocean Energy Inc
—M Zaki and L A Brown, Hughes Christensen Co

IADC/SPE 59239

Bi-Center Innovations Impact Deepwater Drilling

Recent advancements have resulted in a bi-center bit that can be used to drill out and then continue to drill ahead. At the same time ROP, directional control, and hole quality have also improved.

On the first field test of this new technology, bi-centers were used to drill out and drill ahead on 3 consecutive intervals of a deepwater Gulf of Mexico well. The intervals included a vertical section, a build section and a tangent section. In all 3 cases, the drill out was performed with results similar to offset PDC bits, directional targets were all hit with no steering difficulties encountered. The cost savings in trip time alone amounted to over $560,000.

—C M Fielder, Diamond Products International Inc
–D Denham, Shell Deepwater Development Inc

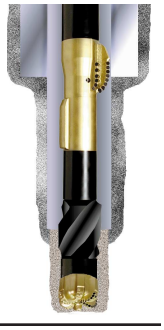
IADC/SPE 59240 (ALTERNATE)

RWD Technology Solves Difficult South Texas Drilling Problem

The authors will discuss the use of ream while drilling (RWD) technology in the 12 1/4-in. section of well S K East No 4 to solve a variety of problems associated with Sarita Field, Kennedy County, Texas. The interval between 11,000 ft-14,000 ft has formations that are highly porous and permeable and can be very "sticky." Additionally, because original reservoir pressure is close to fracture gradient (0.94 psi/ft), it was necessary to minimize equivalent circulating density (ECD) in both drilling and cementing operations.

The operator selected to drill an oversized hole with a 12 1/4-in. RWD tool as a contingency to address the problems described above. Due to lower ECD, the operator did not lose returns during drilling nor while cementing. After drilling the section, caliper logs indicated a close to normal hole diameter (12.4 in.). Deviation of the interval was better than any offset with the final survey showing only 1/2° of divergence from vertical.

IADC/SPE 59240: Ream while drilling technology was used in South Texas due to a highly porous and permeable formation and because the original reservoir pressure was close to the fracture gradient.



—M H Swadi and C Charles, Hughes Christensen Co
–S Kelley, Headington Oil Co