CASE STUDY

Application of Form-A-Squeeze Pill Boosts Drilling, Controls Losses in Mexico Well

"When a partial lost circulation was experienced during drilling a 12¼-in. interval, attempts to seal the loss zone were unsuccessful. Use of the Form-A-Squeeze* pill mixed with diesel allowed us to continue drilling, without loss, reducing time and operational costs."

Operator Drilling Foreman

Well Information

Location ..... Bay of Campeche, Mexico
Fluid type and density ..... Versadril* invert-emulsion, density of 1.30 SG (10.8 lb/gal)
Interval drilled ..... 12¼-in. hole, interval of 3674 ft (1120 m): 2657–6660 ft (810–2030 m)
Temperature at loss depth ..... 198°F (92°C)

The Situation

Drilling was being performed with a 12¼-in. bit at 5853 ft (1784 m) with 1.30 SG (10.8 lb/gal) Versadril invert-emulsion fluid and partial lost circulation at a rate of 11 m^3/hr (69.2 bbl/hr) was observed. Pills containing 100 kg/m^3 (35 lb/bbl) of lost circulation materials (LCM), M-I-X* II Medium and $CaCO_3$ M-70 and M-200 were pumped.

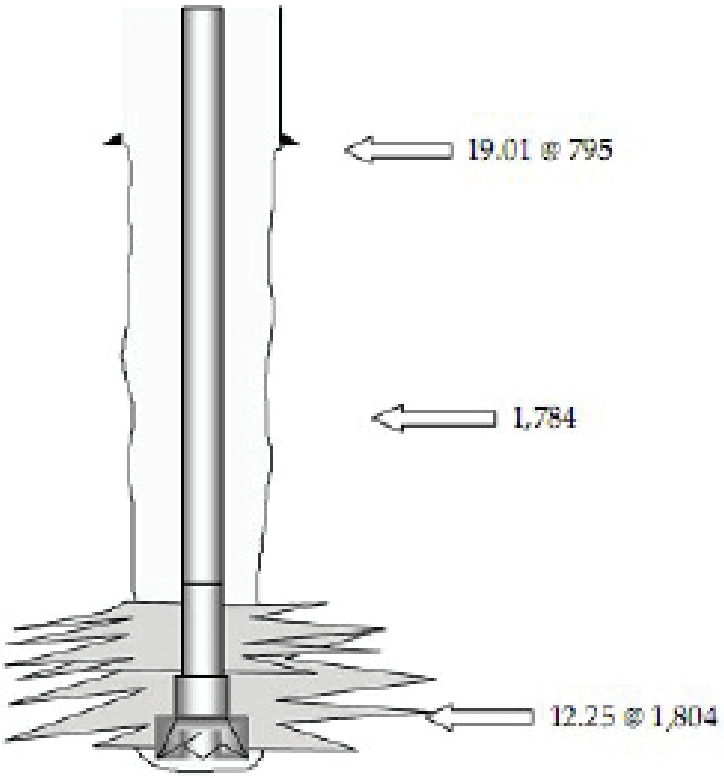
Drilling was continued with a partial loss of 5 to 11 m^3/hr (31.4-69.2 bbl/hr) to a depth of 5,938 ft (1810 m) while pumping LCM pills, accumulating 110 m^3 (692 bbl) of lost mud, resulting in suspension of the operation.

Client operating personnel met with M-I SWACO engineers in search of a technical alternative to properly seal the loss zone and to continue with normal operations.

The Solution

M-I SWACO recommended the use of a Form-A-Squeeze pill to seal the zone where the partial lost circulation occurred. A 50-bbl, 1.31 SG (10.9 lb/gal) Form-A-Squeeze pill consisting of diesel, Form-A-Squeeze additive, and calcium carbonate was prepared and blended.

- Having the bit at 5905 ft (1800 m), 40 bbl of Form-A-Squeeze pill was pumped. Pressure: 600 psi, displaced at 800 strokes per min.
- Lifted bit to 5459 ft (1664 m), circulated at a low flow rate of 10 strokes for 5 min; then pumping was suspended, annular preventor was closed, satisfactorily repressurizing with 200 psi for 10 min.
- Pressure was discharged to zero; annular preventor was opened and initially circulated at a low flow rate. The flow rate was gradually increased until initial drilling conditions were attained: 120 strokes, 540 gal/min, 2200 psi. No mud losses to the formation were observed.
- The 12¼-in. section was taken to bottom, circulated at a low flow rate, increasing little by little until reaching and maintaining 540 gal/min, and continued drilling with normal circulation



Last casing	795 m (2606 ft)		
Int. Diam.	19.01 in.		
Bit Diam.	12¼ in.		
Total depth	1804 m (5917 ft)		
DC	51.36 m (168.46 ft)		
OD DC	8 in.		
ID DC	2.81 in.		
Inside Vol.	0.21 m³ (1.32 bbl)		
Annular Vol.	2.24 m³ (14.08 bbl)		
HW	168.35 m (552 ft)		
OD HW	5 in.		
ID HW	3 in.		
Inside Vol.	0.77 m³ (4.84 bbl)		
Annular Vol.	10.67 m³ (67.1 bbl)		
DP	1584.29 m (5196 ft)		
OD DP	5 in.		
ID DP	4 in.		
Inside Vol.	12.84 m³ (80.75 bbl)		
Annular Vol.	100.40 m³ (631 bbl)		
Theoretic Top	1664 m (5458 ft)	Vol. OH	10.67 m³ (67.1 bbl)
Bottom	1804 m (5917 ft)	*Annular Vol.*	113.30 m³ (713 bbl)
Pill Length	140.3 m (460 ft) Strokes t/displacement 792		
Annular Vol.	5.64 m³ (35.47 bbl)		
Inside Vol.	0.41 m³ (2.6 bbl)	*Inside Vol. Drill Pipe*	13.82 m³ (87 bbl)
Pill Vol.	6.04 m³ (38.02 bbl)		
Pump Output	4.5 gal/strk	*Total Volume*	127 m³ (799 bbl)

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Time (min)	Pressure (psi)	Bbl
2.5	50	1.6
5	100	3.2
7.5	150	4.8
10	200	6.4
15	200	7

Time	Pressure (psi)	Bbl	Remarks
10	150–200	7	Pressure was kept constant

The Results

After pumping the Form-A-Squeeze pill:

- A complete cycle was circulated at 540 gal/min, keeping normal levels.
- Drilled to bottom without experiencing lost circulation, keeping normal levels at surface.
- No waiting-on-cement times were required.
- Continued drilling at the scheduled depth with normal circulation.
- Waiting times were eliminated.
- Operational costs were reduced.
- Continued drilling the stage below scheduled times.

Questions? We'll be glad to answer them.

If you'd like to know more about the Form-A-Squeeze product and how it's performing for our other customers, please call the Alpine Specialty Chemicals or M-I SWACO office nearest you.

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