



PIPE RUBBER™

Case Histories

Deepwater GoM (Water depth >3,000 ft)

Operator losing returns with 12.0 ppg synthetic fluid 150 feet below 13 5/8" casing. Operator re-squeezes shoe to obtain 12.5 LOT for drilling ahead.

Initial treatments with Calcium Carbonate, Fiber and graphitic material, ineffective.

NER makes recommendation to use 100 bbl sweeps with:
30 ppb PIPE.RUBBER (pumped through LWD)
20 ppb fiber

Maintenance recommendations:
5 sx. PIPE.RUBBER per hour
3 sx. Fiber per hour

Results:

Operator drills 1750 ft of hole before setting pipe.

Toxicity:

Synthetic system LC50 prior to treatments was >350,000 ppm, after treatment the toxicity remained >350,00ppm.

Deepwater GoM (Water depth >4,000 ft)

Operator loses fluid with synthetic system and converts to 11.8 ppg PHPA with 4% olefin.

Maintenance Treatments made by operator:
3-5 sx. of PIPE.RUBBER per hour for seepage loss control
3-5 sx. of calcium carbonate added per hour for seepage control

Sweeps:
10-30 ppb of PIPE.RUBBER
5-15 ppb of fiber
10-20 ppb of calcium carbonate

Results:

Interval was drilled with minimal losses

Toxicity:

LC50 of original system was 270,000 ppm. System remained at 270,000 ppm after PIPE RUBBER treatment

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Case Histories (cont.)

September 2002 - 25 ppb Pipe Rubber outperforms 100 ppb graphite

FIT was 18.2 and increased to 18.5 after squeeze

Land well in Oklahoma using 17.3 diesel mud @300F

Lost total returns in 6 ½" hole @ 17,300^{+/-} MD

Spotted 100 ppb graphite and returned to drilling with 18.2 ppg PWD reading

Lost returns again – spotted 25 ppb Pipe Rubber – pressured formation to 18.5 ppg – drilled to TD

Deepwater Mississippi Canyon

Losses reduced from 3500 bbl on original well to zero on sidetrack

Operator encounter massive losses on original well with ester/olefin blend Switch to alternative blend for sidetrack

Add ¾ ppb Pipe Rubber while drilling 8 ½" ST and have no losses while drilling, running pipe and cementing

Deepwater GoM (Water depth >5,000 ft)

Mud Engineer uses rubber as final option and reduces losses 75%

Operator losing returns with synthetic fluid at a rate of 50-60 bph.

Products tried included cellulose fibers, sized calcium carbonate and graphitic carbons.

29 sacks left over from previous operator. Mud company was persistent in using only calcium carbonate and graphite.

As last request of company man, mud company added Pipe Rubber.

Email from company mud engineer:

Concentration: 15 ppb (50 bbls each)

> **pumped total of two sweeps**

> **losses before were 50 to 60 bbl/per/hr**

> **losses after were 10 to 20 bbl/per/hr**

Deepwater GoM

Situation:

After pulling the storm packer following hurricane evacuation the well was taking SBM fluid.

Trip to bottom with losses at 175 bph while static.

A 65 ppb pill with calcium carbonate and **Pipe Rubber** (30 ppb) reduced the losses to 70 bbl/hr.

Cemented well.

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Case Histories (cont.)

South Texas

400°F BHT

Pipe Rubber added in 20 ppb sweeps and regained circulation after having zero returns.

Problems persisted and the well was cemented and re-drilled with a WBM.

Recommendation to add Pipe Rubber while drilling was never applied. History has shown that sweeps have temporary benefit unless there is only one thief zone. Fractures must be treated while drilling.

Pipe Rubber used to drill 16” riserless interval with a CaCl₂ drilling fluid.

Challenge:

Anticipated fracture gradient of 10.1 ppg

Fluid density of 9.3 ppg to 9.8 ppg

High permeability sands create threat of extreme seepage losses. Addition of conventional loss circulation material results in excessive increase in fluid density relative to the fracture gradient.

For Example: calcium carbonate has a specific gravity of 2.6 (21.7 ppg)

Steelseal, G-Seal and other graphites – 2.1 SG (17.5 ppg)

Fibers have lower SG's but the particle size is not effective in sealing highly permeable formations

Solution

A large particle size for sealing highly permeable sands that will not increase the density of the drilling fluid. Compatibility with the system is obvious.

PIPE RUBBER™ has a SG of 1.1-1.2 (9.2 –9.8 ppg). Additions in this application are only limited by rheology. The product will not increase the density.

PIPE RUBBER™ has a particle size of 1--420 microns.

Results:

The riserless section was drilled using Pipe Rubber @ 15-30 ppb. Losses were avoided while drilling, running pipe and cementing. No viscosity problems were experienced.

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Case Histories (cont.)

Skins in production zones with PIPE RUBBER

Four wells show negative skins in the production when using Pipe Rubber in various Synthetic Based Muds. All wells were Frac-Pac completions.

Compatibility with PHPA water based mud

Results of the compatibility tests.

Fluid Sample:
12.8 ppg NaCl/PHPA

MC 815
Ocean Victory

Test conducted at 120°F

| Concentration | 600 RPM | 300 RPM | PV | YP |
|---------------|---------|---------|----|----|
| Base | 87 | 52 | 35 | 17 |
| 2.0 ppb | 86 | 53 | 33 | 20 |
| 4.0 ppb | 87 | 53 | 34 | 19 |
| 6.0 ppb | 87 | 54 | 33 | 21 |
| 8.0 ppb | 88 | 55 | 33 | 22 |
| 15.0 ppb | 93 | 55 | 38 | 17 |
| 20.0 ppb | 95 | 56 | 39 | 17 |
| 30.0 ppb | 108 | 67 | 41 | 26 |

The mud continued to flow very well even at 30.0 ppb.
