CASE STUDY

M-I SWACO Technologies Free Stuck Drillstring from Swelling Formation in Stock Water Well Project

Integrated solution eliminates need to drill a new well, saves an estimated USD 30,600 in Niobrara chalk

CHALLENGE

Free drillstring stuck in swelling formation during stock water well drilling project, Nebraska.

SOLUTION

Integrate RINGFREE† polymeric thinner with PLATINUM ROD EASE† coring, microtunneling, and rotary drilling lubricant to free the bit and downhole tools.

RESULTS

Freed drillstring and completed project without drilling a new borehole, saving an estimated USD 30,600.

Idle bit lodged in swelling formation during water well drilling

A customer planning a 1,100-ft [335-m] stock water well had cemented 500 ft [152 m] of 5-in steel casing and continued drilling through the surface pipe into the Niobrara chalk. When discontinuing drilling operations for the weekend, the driller did not pull the bit into the casing but left the tool at 580 ft [177 m]. The driller was using only native mud without filtration control. However, without filtration control, the Niobrara Formation swells when water is used for drilling operations. When attempting to resume operations on Monday, the driller experienced circulation but could not rotate or move the drillstring because the chalky formation had swollen.

Integrated solution deployed to free stuck drillstring

The driller mixed a viscosifier into the drilling fluid and circulated it in the well for 2–3 hours. However, no cavings or cuttings were returned to surface, and the bit was still stuck. M-I SWACO then recommended running a mixture of RINGFREE thinner and PLATINUM ROD EASE lubricant to displace the viscosifier mixture from inside the drillpipe. RINGFREE thinner helped remove bentonite clays from the drillstring, and the thinner dissolved rapidly. The PLATINUM ROD EASE lubricant was recommended because it reduces torque and drag and lubricates all downhole consumables.

Product mix resolved problem, saved USD 40,600

The displacement was attempted by capping a smaller pipe off on one end and running it 60 ft [18 m] inside the drillpipe. Afterward, approximately 2.5 galUS [9.5 L] of the RINGFREE thinner and PLATINUM ROD EASE lubricant mixture was pumped into place but was not initially successful at loosening the drillstring.

M-I SWACO then calculated the volume from the bit to the bottom of the surface casing (63 galUS [238 L]) and the volume of the drillpipe, rig plumbing, and mud pump (108 galUS [409 L]). A combination of 60 galUS [227 L] of RINGFREE thinner and 20 galUS [76 L] of PLATINUM ROD EASE was mixed in a small tank. This mixture was pumped down the drillpipe and allowed to set for 2 hours. After three hard pulls, the drillpipe was pulled loose and freed on the fourth attempt.

The customer used 105 galUS [397 L] of MAX GEL† viscosifier to flush the RINGFREE thinner and PLATINUM ROD EASE lubricant from the hole and resumed drilling with fresh fluid. On bottom, the customer used a fresh mix of MAX GEL fluid and PLATINUM PAC lubricant to finish the well.

Total cost savings on the well was an estimated USD 30,600. Savings included 9 days of labor, fuel cost, and rig time estimated at USD 1,000 per day. Additional savings were assumed from forgoing the expense of replacing 500 ft of 5-in steel pipe and cement at a cost of USD 20 per foot—a total of USD 10,000 for the well. The replacement cost for the 580-ft drillstring, subs, and bit would have totaled USD 11,600 or USD 20 per foot. The customer is now consistently using PLATINUM PAC lubricant to prevent drilling problems in the swelling shale.