Case study: South Texas, United States

CIRCA Pro software replaced outdated SOPs, prevented downtime

CIRCA Pro software provides the ability to predict remaining and removed debris volumes over time based on specific pump rates, tripping speeds, well depth, and coiled tubing pressures.

There's no frustration like not being able to conduct an operation the right way. But it happens. Recently in south Texas, a coiled tubing service provider was told by a field consultant to use what looked like low pump rates to perform a millout on a recently perforated well.

As wells and laterals have grown longer, and the number of stages has increased, conducting the millout run in plug-and-perf operations has grown more complex. Milling 10 plugs and circulating the debris out of hole in a 6,000-ft (1,830-m) lateral requires an entirely different set of capabilities than milling 50 plugs in a 12,000-ft (3,660-m) lateral. In this scenario, there would be more than five times the debris and nearly twice the fluid volume. Fluid volumes, pump rates, and tripping speeds all combine to provide enough force to carry the plug debris generated during milling to the surface. Unfortunately, the old standard operating procedures (SOPs) tend to still rely on outdated rule-of-thumb guidelines to establish coiled tubing cleanout procedures.

Suspecting that the suggested pump rates were too low and the tripping speeds were too high, the coiled-tubing service provider plugged fluid volume, pump rate, and tripping speed data into the **CIRCA™ Pro modeling software** for complex CT operations. After testing several scenarios, CIRCA Pro calculated that higher pump rates and slower tripping speeds were required to perform a full cleanout and avoid sticking the bottomhole assembly (BHA). Unwilling to accept these new values, the field consultant insisted that the rates and speed indicated by the SOP be used.

Results

- Corrected outdated rule-of-thumb guidance use in SOPs
- Reduced risk through pre-job modeling
- Avoided downtime and cost of stuck coiled tubing

Challenges

- Outdated SOPs causing stuck coiled tubing
- Extended-reach plug milling job in 23/8-in. casing
- Reluctance to trust solids transport modeling data

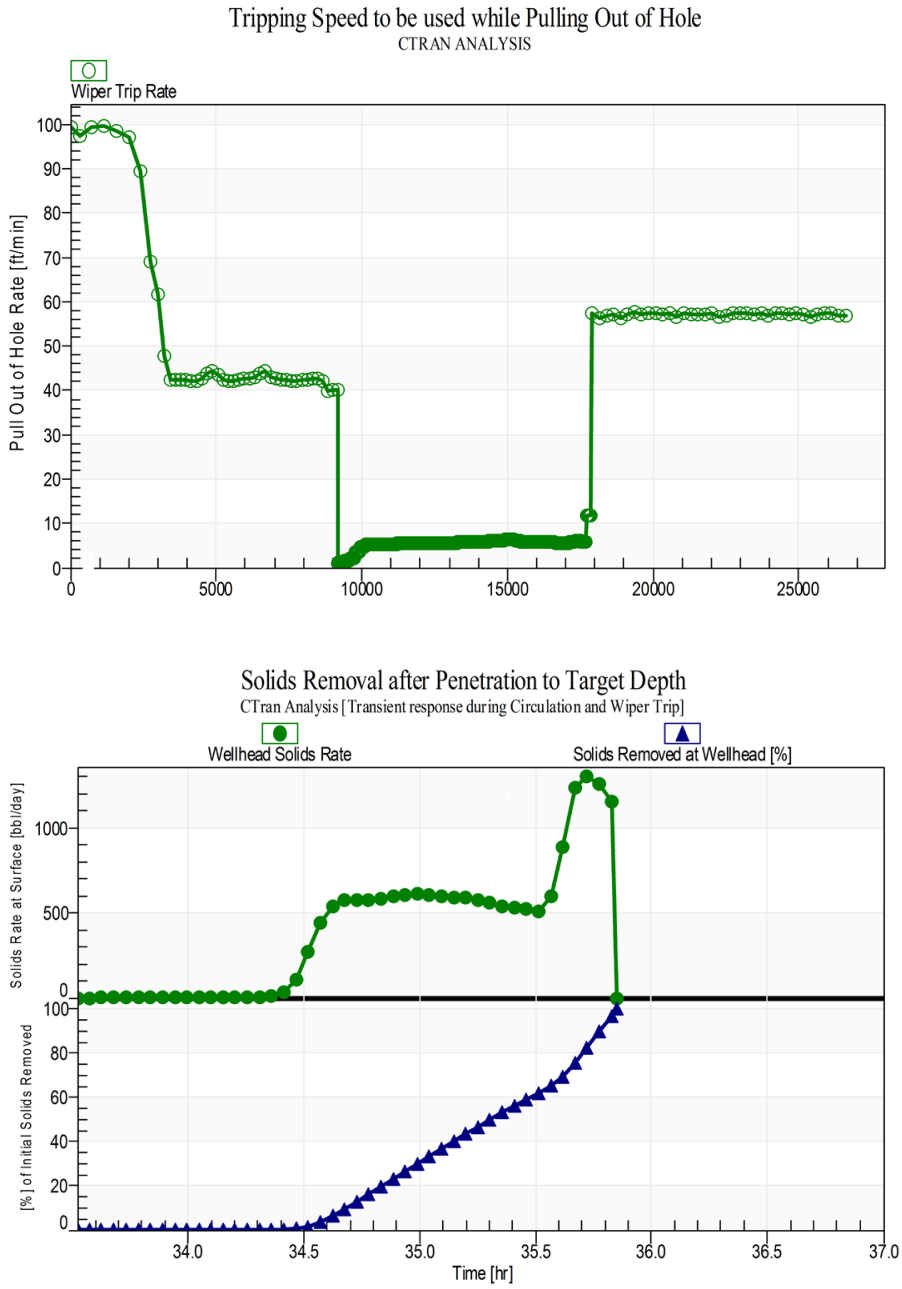
Baker Hughes solution

- Used **CIRCA Pro software** to determine minimum flow rates and maximum wiper tripping speeds needed to perform a full cleanout and avoid sticking the BHA
- Followed pre-job cleanout model to successfully manage debris during the millout operation

The service provider conducted the job as instructed. But while pulling out of hole after milling out all plugs, the coiled tubing became stuck. Operations were shut down for two days until constant fluid circulation finally freed the BHA. This tripled the expected time for the millout operation.

After an extensive review of all data from the job alongside the initial CIRCA Pro job model, the operator realized that the rule-of-thumb pump rates and tripping speeds called for in the SOP were inadequate. Immediately seeing the value of using CIRCA Pro solids transport analysis to establish job parameters instead of an outdated and generic SOP, the operator made the coiled tubing service provider responsible for future millout planning.

CIRCA Pro software has been used to model, plan, and execute solids transport on more than 30,000 wells to date. In this case, the service provider has delivered months of millout jobs in south Texas without encountering another instance of stuck coiled tubing. Further, the operator reduced costs by avoiding nonproductive time and the need for intervention/fishing to retrieve tools stuck downhole.



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