

# Tornado Coiled Tubing Cleanout System

Recover lost production and reduce cleanout frequency

**The Tornado™ coiled-tubing (CT) cleanout system** from Baker Hughes is the most powerful, flexible, and effective CT wellbore cleanout method available. It is ideal for removing a variety of solids from any wellbore geometry and trajectory. The patented system allows flexibility in running accompanying bottomhole assemblies such as standard wash nozzles, motors and mills, or rotary jetting tools. You get an optimized cleanout, even with compacted or loosely consolidated fill such as formation fines, pebbles, and proppants.

A suite of proprietary, custom-designed downhole tools complement field-proven operating methods to maximize the Tornado system's capabilities. These tools provide full forward-facing washing capability while penetrating fill material, and can be switched to high-rate uphole sweeping during the engineered wiper-trip procedure.

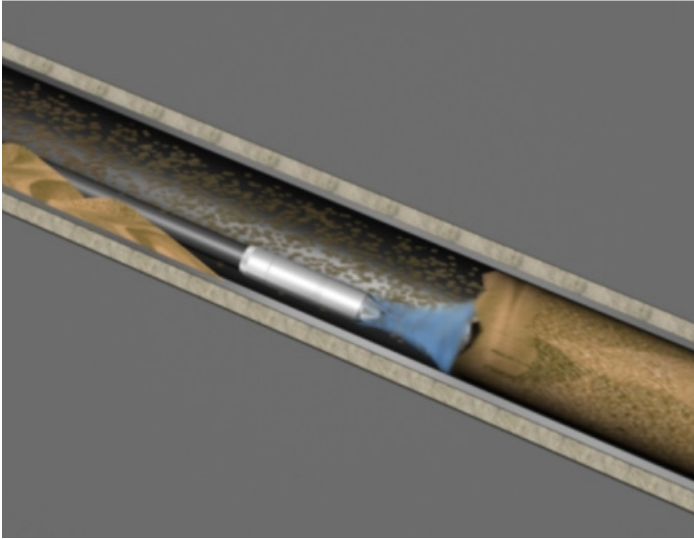
A unique solids transport simulator, based on results of nearly 10,000 flow-loop tests and correlated with thousands of successful jobs from around the world, is integrated into the Baker Hughes **CIRCA™ modeling software**. The CIRCA software maps the progress of solids accumulation along the completion on their way to the wellhead and generates an optimized cleanout solution, including required flow rates, circulation time, tool configuration, penetration, and wiper-trip speeds. Combining the power of the CIRCA software with optimized downhole tools enables Baker Hughes engineers to perform successful cleanouts that were previously impossible to complete.

## Applications

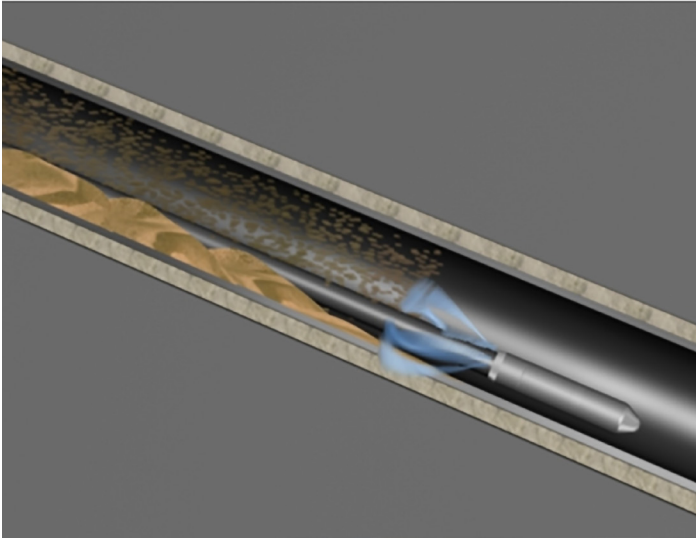
- Removal of loose fill material such as formation fines, rocks, proppants, and perforating and milling debris
- Removal of compacted solids requiring high-pressure jetting or milling such as scale
- Large-diameter, highly deviated, or horizontal wellbores

## Benefits

- CIRCA engineered circulation and wiper-trip methodology
  - Boosts production while increasing the interval between cleanouts.
- Uses simple cleanout fluids and smaller CT
  - Reduces job costs and minimizes nitrogen and fluid volumes
- Choice of flow operated multicycle, or single-trip, ball-operated switching tool
  - Provides the right tool for nearly every operational requirement
- Easy-to-apply field procedures
  - Maximizes reliability and system efficiency
- Rearward-facing jets
  - Decreases overall job time
  - Prevents solids from compacting around the BHA and reduces the risk of stuck pipe



The forward-facing jets break up compacted solids while running in hole. These solids typically form a fill bed along the wellbore, behind the bottomhole assembly (BHA).



The rearward-facing jets erode the fill bed while wiper-tripping out of hole, carrying the solids to surface.