

# BHGE VACS technology and chemicals provided ultimate well clean-out

Baker Hughes, a GE Company (BHGE), was requested to provide an efficient clean-out solution for an operator in Ward County, Texas. Suspected solids and debris of previously milled-up sleeves, sand, and scale were collected inside a 7 x 4½-in. liner hanger system comprising an openhole completion system equipped with multiple packers and sleeves.

Due to low bottomhole pressure, low fluid level, associated challenges to circulate, and the high operational risk of coiled tubing the operator had limited options to achieve a successful clean-out.

BHGE recommended the **Vectored Annular Cleaning System (VACS™) technology** in combination with BHGE chemicals. The VACS tool does not require circulation to surface. By pumping through the VACS tool reverse circulation is established and a powerful suction force is created at the bottom of the tool, pulling debris into the tailpipe. Running the 2 7/8-in. OD VACS tool on 2 3/8-in. OD tubing allowed optimization of the clean-out through the horizontal sections of the wellbore by washing over the hard-pack sands, solids, and debris mixture.

The clean-out assemblies included a 2 7/8-in. VACS tool, debris retainer comprised of 1,000 ft (305 m) of 2.375-in. tubing including check valves, and a selection of a shoe or a bit on bottom of the BHA. Additionally, a BHGE-designed chemical treatment was implemented to support removal of the debris.

During VACS operations, the wellbore was washed from 7,619 to 10,188 ft (2322 to 3105 m). The first trip utilized a 3.750-in. washpipe shoe with Bowen™ finger catchers to retain the larger debris suspected to be left in the hole from previous milling operations. Subsequent trips used a 3.750-in. skirted Tricone and PDC workover bit. During two of the five trips needed to clean out the well, 15% hydrochloric (HCl) acid was spotted onto the bottom of the BHA to assist in breaking down the tougher scale.

With the strong suction provided by the VACS tool and assistance from the HCl acid, the ultimate recovery for the well's clean-out consisted of 50.5 joints of debris with a total weight over 2,600 lbs. Upon further testing of the debris, it was verified as formation sand, calcium carbonate, and iron sulfide.

## Challenges

- Perform clean out in the lateral from 7,619 to 10,188 ft (2,569 ft total)
- 4.500-in. 11.60 ft/lb production casing filled with multiple types of debris from previous operations
- Loss of circulation during the clean-up operations preventing adequate conventional or reverse circulation operations

## Results

- Reduced costs required for coiled tubing unit rental and energized fluids, saving the operator \$180,000 USD
- Reduced the operational risk of getting stuck associated with coiled tubing in a horizontal, low-bottomhole pressure well
- Recovered 50.5 joints of 2.375-in. tubing filled with debris (222 gals or 5.29 bbls)
- Over, 2,600 lbs of total debris was recovered
- Increased oil production by 365% following VACS clean out

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