

Vx Spectra Flowmeter Quantifies Proppant Flowback in Real Time During Postfracturing Plug Drillout

High-resolution, real-time monitoring enabled successful quantification of proppant flowback during plug drillout operations for future optimization

CHALLENGE

Better understand proppant flowback during plug drillout operations.

SOLUTION

Deploy PhaseTester* portable multiphase well testing equipment with Vx Spectra* surface multiphase flowmeter for real-time flow rate monitoring and solids quantification during plug drillout operations.

RESULTS

- Quantified proppant production at a 10-s resolution for four wells.
- Explained proppant flowback concentration profile.



Quantify proppant returns and control well during plug drillout operations

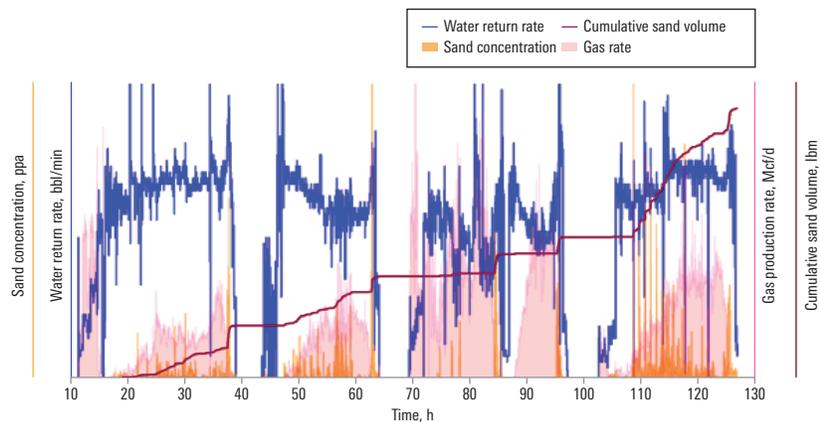
Effective wellbore cleanout of proppant is one of the objectives of postfracturing plug drillout operations. This operation requires keeping the well on balance to ensure that no additional proppant is produced from hydraulic fractures because it can ultimately be detrimental to well productivity and have a negative impact on production equipment. Achieving these objectives requires a reliable technique for quantification of proppant returns and characterization of well balance conditions.

An operator completing postfracturing plug drillout operations in the Eagle Ford Shale in Texas wanted to monitor in real time instead of the standard one-hour interval measurements. The higher-resolution data would enable identifying potential improvements in drillout methodology and mitigate environmental concerns during postfracturing cleanup.

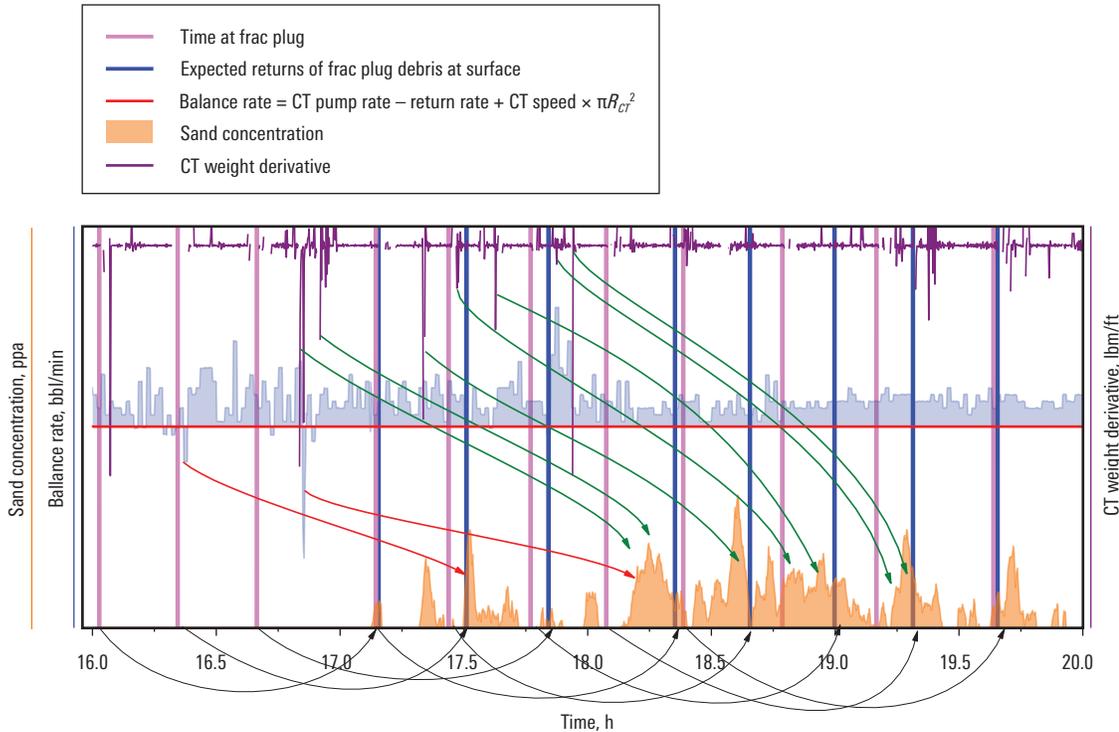
Run PhaseTester equipment with Vx Spectra flowmeter for real-time multiphase flow rate monitoring and analysis

Schlumberger recommended deployment of PhaseTester portable multiphase well testing equipment with the Vx Spectra surface multiphase flowmeter to integrate real-time multiphase metering and solids quantification capabilities. The Vx Spectra flowmeter is specifically designed for surface production facilities and customizable to fit a broad range of operating parameters and flow rates in providing single-point measurement to ensure accurate, repeatable data. It uses advanced full-gamma spectroscopy and fluid dynamics models to determine the flow rates of individual fluid phases without separation. Capable of providing high-resolution data at less than a 1-s interval, the Vx Spectra flowmeter is the ideal choice for real-time monitoring of flow rates.

Typical noninvasive proppant quantification techniques require the input of fluid composition to compute proppant production. Accurate measurement of fluid composition is especially important for multiphase fluid flow because the frequently changing fluid composition affects the computations. In this situation, the Vx Spectra flowmeter excels because it performs measurements at frequencies sufficient for addressing the variability in fluid composition.



Vx Spectra surface multiphase flowmeter data showing sand quantification during plug drillout operation on four-well pad.



An evaluation plot showing correspondence between downhole events and sand proppant returns at surface.

Revealed proppant flowback behavior to optimize future operations

Employed on the four-well pad during plug drillout operations, the Vx Spectra multiphase flowmeter provided high-resolution flow rate measurements for fluid and proppant returns at surface to enable successful real-time monitoring of the drillout operations. Quantification of the overall sand mass by using the Vx Spectra flowmeter was confirmed by correspondence with the quantity of sand estimated by the standard hourly sampling technique. The collected data demonstrated considerable variability in proppant and early gas returns among the wells, depending on the parameters of the performed operations.

Real-time monitoring enabled the interpretation of proppant flowback behavior. The proppant concentration profile at surface is a complex result of three types of downhole events: sourcing proppant from the top of the frac plugs, producing proppant from fractures, and picking up remaining proppant from the wellbore, as indicated by changes in the weight of the CT string. All collected data will be used to optimize subsequent drillout operations.

Deploying this methodology revealed sourcing of proppant production from the top of frac plugs. The mechanics of drillout operations pushed the remaining components of the frac plug downhole by the mill, which collected proppant from the wellbore and moved it to the location of the next plug. Furthermore, millout of the remaining components of the frac plug flushed this collected amount of proppant to the surface, resulting in peak measured proppant concentrations.