Microseismic services improve understanding of frack, refrack programs

MicroSeismic Inc.

MicroSeismic Inc. recently worked with a client to evaluate lateral and vertical wellbore spacing as well as fracture height on a multiwell stacked completion in the Permian Basin. The stacked wells were landed in three main formations, and treatment effectiveness was analyzed with surface and downhole microseismic data. Lateral propped fracture length was used to determine optimal well spacing, which improves production and optimizes costs by avoiding treatment overlap and gaps. Analysis of vertical coverage of the propped fractures revealed that some formations were not fully propped, so MicroSeismic recommended adjustments to the corresponding well placements or a change in treatment.

In 2014 MicroSeismic entered into the downhole microseismic business with a differentiated and enhanced offering from the traditional downhole processing techniques. Over the last year, it has developed and applied its passive seismic emission tomography (PSET) to downhole microseismic applications. PSET Downhole was developed to overcome the issues faced with traditional compressional (P) and shear (S) wave picking methods to process downhole data. The new technology uses the full waveform of P waves and S waves and Kirchoff imaging principles to more accurately locate events.

MicroSeismic sees the current oil price environment as an opportunity to continue to develop new services that provide operators with a way to cost-effectively improve production. The company is now delivering a service specifically designed for monitoring refracks, the Refrac Performance Package, that allows clients to understand in real time when they have begun to fracture new rock vs. restimulating rock that was fractured during the first completion.

MicroSeismic's Refrac Performance Package allows operators to understand in real time if they are fracturing new rock vs. restimulating prior fracks. (Source: MicroSeismic Inc.)

Much has been written lately on the drawbacks of "factory mode" drilling and completion methods in shales. The underlying issue is that the different geology needs different treatment to optimize production. MicroSeismic sees this trend continuing to develop as operators use microseismic along with other completions evaluation techniques to eliminate avoidable costs and improve production in real time. ■

Beyond conductivity

CARBO Ceramics

For 70 years proppant technology has primarily consisted of uncoated frack sands, resin-coated proppant and ceramic proppant. These three tiers of proppant have served, and continue to serve, as the workhorse for propping open hydraulic fractures and have allowed for the successful development of many otherwise uneconomic reservoirs.

Recently, CARBO has embarked on a path to use proppant for more than deploying conductivity in the fracture. The company has identified three primary areas of technology development to allow operators to use proppant to increase their production and lower operating costs—production assurance, flow enhancement and evaluation services. All three use the ceramic proppant grains to deploy technology to meet these challenges.

In the area of production assurance, specially manufactured ceramic proppant is infused with production assurance chemicals that are slowly released at engineered rates to inhibit the formation of scales, wax, salts and other downhole issues. In early 2014 SCALEGUARD was deployed in several wells in the Uinta Basin and, after several months of scale-free production, appears to be outperforming other comparable technologies. The scale prevention is currently projected to last multiple years and provide a significant reduction in lease operating costs. The success of this product is leading to the development of other assurance tech-

SCALEGUARD technology is an encapsulated ceramic proppant infused with scale inhibiting chemicals that is placed throughout the entire fracture to ensure chemistry is exposed to all production upon contact with water. (Source: CARBO Ceramics)

nologies such as paraffin, salt, hydrogen sulfide and asphaltene. In the area of flow enhancement, chemistry is used to increase the flow of hydrocarbons through the proppant pack. A new relative permeability modification technology has been developed that places a neutral wettability surface on the proppant grain. This virtually eliminates capillary pressures in the proppant pack, allowing for increased fracture fluid cleanup, larger effective drainage area and higher production.

The evaluation services platform uses technology to assist in evaluating the completion. Nonradioactive tracer technology can be used to help visualize the fracture by placing a nonradioactive taggant in each proppant grain that allows detection using a standard neutron log. This information can then be used to help operators optimize their completion strategy through a better understanding of fracture geometry, near-wellbore connectivity and perforation/staging efficiency.

Because each barrel of oil that is produced in today's unconventional reservoirs must pass through the proppant pack, proppant becomes an ideal way to deliver chemistry and technology to the production stream to solve difficult E&P challenges. ■

System delivers increased proppant volumes

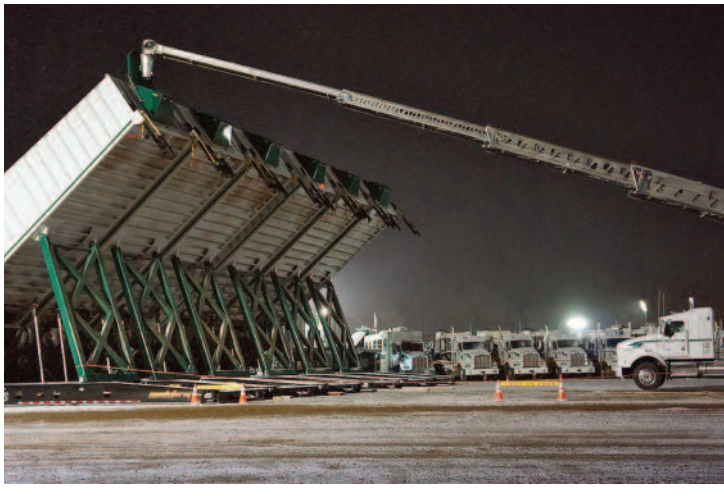
Calfrac Well Services

Partnering with a manufacturer to develop and implement the SandStorm has resulted in wins for Calfrac's customers, the environment and the team working at the well site. With a focus on large-scale unconventional resource development, there was a need for a tool that would better meet the demands of challenging extractions. Properly extracting oil and natural gas from deep complex reservoirs requires injecting a mixture of proppant and fracturing fluid into the subsurface at high rates and volumes. The large volume of materials required creates logistical challenges, especially with proppant delivery.

Calfrac's implementation of the SandStorm proppant delivery system resulted in a highly calibrated high-volume gravity-fed rapid deployment system engineered specifically for natural resource extraction from shale plays.

An engineered series of storage units, the SandStorm can be easily scaled up or down, depending on the need. With a footprint roughly 30% less than its predecessors, the rig-up and rig-down is significantly improved. The SandStorm uses a simple telescoping belt to quietly and cleanly transport twice the volume of proppant that can be achieved with pneumatic systems. Use of the SandStorm effectively decreases its transport traffic on private and public roadways by 50%.

Development and implementation of innovative tools like the SandStorm are important to the future of responsible extraction and development of natural resources. With the scale and complexity of projects continuing to increase, new fluid systems are being developed that further reduce the use of freshwater. The company expects that developing new technologies and processes that enhance efficiencies will continue to advance the industry. ■



A SandStorm system works through the night in the Marcellus play in Pennsylvania. (Source: Calfrac Well Services)