

Making MajiFrac

InnovOil gets the low-down on Tendeka's new MajiFrac Solution

HYDRAULIC fracturing has a bad reputation when it comes to the environment. Events such as the recent spate of earthquakes at Cuadrilla's fracturing site in Lancashire in the UK have put the controversial practice under closer scrutiny.

The amount of water that hydraulic fracturing consumes is another concern. Not only does it pose a risk to the water table and uses a precious resource in fresh water; it is also expensive for fracturing companies to source the huge amounts of water involved.

Services company Tendeka has launched a combined product solution aimed at reducing water use and pumping time during completion operations in unconventional shale plays in the US, which it has dubbed the MajiFrac Solution.

InnovOil spoke with Tendeka vice president for North and South America Suzanne Stewart and business development manager Elizabeth Cambre.

"Operators are being driven towards using more and more produced water, and that's part of the challenge with the compatibility with some of the components that are added to the fracturing water," Stewart said.

Formation water is produced alongside oil and gas from a reservoir. Since it is unfit for human consumption, as well as a number of other purposes, it makes sense to use this in fracturing instead of scarcer freshwater. However, there are still naturally



Suzanne Stewart , vice president for North and South America, Tendeka

occurring components both within it and that are added during the fracturing process that make its use challenging.

"When you move from conventional fracturing to unconventional fracturing, the amount of water required can be from 100-100,000 times more than what would be used with conventional production," Cambre explained. "According to publicly available data, the amount of water that's been used in the key basins from 2009 to 2016 is 7.6 billion barrels of water.

"With government regulations in the US, there's a big drive to find solutions to the amount of water being used," she added.

Working together


To that end, Tendeka devised the MajiFrac Solution, a combination of a thermally stable modified acid system, a composite frac plug, which incorporates a pump down feature to minimise water bypass, and MajiFrac, a range of high-viscosity friction reducers.

"Typically before a fracturing job, a spearhead acid is pumped," Cambre said. "The acid is pumped to clean up the perforation debris, thereby decreasing perforation friction pressure."

Tendeka is promoting a way to chase the plug with acid and perforate in acid as a way to save time and money. "You could eliminate an entire wellbore volume of water, which can be from 200-400 barrels per stage, if you could just run your perforating gun in acid," Cambre explained. "The reason that's not being done today is still how corrosive hydrochloric (HCl) acid is, even with an inhibitor package."

Most frac jobs use HCl acid or a urea-based acid. These are highly corrosive, posing a risk both to humans and assets used during fracturing. "The big concern is having the wireline sitting in acid," Stewart added. "The wireline companies don't want hydrochloric acid around their wireline because it's detrimental to the wireline."

The modified acid, in contrast, is harmless to the skin and achieves ultra-long-term corrosion protection compared to conventional acids, reducing risk to personnel, and has minimal effect on



perforating tools and wireline even at high temperatures.

“With the MajiFrac Solution, the modified acid, although it’s still effective at breaking down any of the debris in the perforation tunnel and acting as a spearhead acid, [is] not corrosive to wireline. You can actually pump the frac plug and the perforating guns down and spot the modified acid across the zone you’re going to perforate without the concern that the wireline is going to be impacted.”

Perforating in modified acid not only helps to clean up perforation debris across the entire interval, but in doing so also helps to ensure that the main fracturing treatment is more uniformly distributed across the entire zone.

The plug has been proven to be unaffected by the modified acid. “The plug design includes a pump down feature to minimise water bypass and the modified acid is spotted with the plug across the zone of interest. This minimises large water volumes that are typically consumed before the main fracturing treatment is even pumped,” Stewart noted.

The high-viscosity friction reducers (HVFRs) help to mitigate some of the problems with utilising produced water. “One of the biggest challenges over the past couple of years has been finding a solution to using produced water as a base fluid or a fracturing fluid,” Cambre said. “There’s a big trend of moving from guar-based fluid

systems to high-viscosity friction reducers. These high-viscosity friction reducers are actually more tolerant to high dissolved solids in your fluid and they will still maintain the right fluid characteristics to carry and place proppant.

“Typically, companies use 50% produced water and 50% fresh water, and now there’s a drive to use 100% produced water. There are a lot of different chemistries that are out there but it’s really about trying to find the right formulation for a given customer, so they can use 100% produced water,” she added.

Tendeka’s HVFRs deliver improved drag reduction, without the need for a booster, at ultra-low dosages. Because of its elasticity, it can transport high loadings of sand at low dosages. It can also be used across a wide range of water qualities without losing its efficacy.

By utilising the acid sooner in the fracturing process, the MajiFrac Solution makes a significant time saving. “Five to fifty minutes per stage is saved, and there’s on average 40 stages per well and four wells per pad,” Cambre noted. “In one example, the MajiFrac Solution delivered savings of up to 50,000 barrels of water and reduced pump operating times by 200 hours,” Stewart said. ■

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