

The Magic of Produced Water

Water reuse in hydraulic fracturing a significant boon for the industry

By Eli Gruber

Proven industrial water treatment options have existed for decades in many sectors, and they are evolving to accommodate a process in the oil and gas sector that desperately needs them: hydraulic fracturing (fracking).

In a recent survey conducted by Ecologix Environmental Systems, 85% of energy industry professionals said water management is the top issue for fracking and is in need of regulation.

More and more, lawmakers are agreeing. Fracking regulations are typically seen as state issues, and many states like California and Illinois have adopted laws that govern how drilling is to be conducted. The federal government also has chimed in, and the Bureau of Land Development proposed guidelines that must be followed by drillers who would like to frac on federal lands.

Regulation is a growing trend, and it is a wise bet to expect more of it in the future. Another trend is that the regulations concerning water use and disposal are getting tougher and more restrictive, which also can be expected to continue. Many of the new laws address water management concerns and govern storage and disposal of wastewater. Unlined pits, for example, are no longer allowed on federal land, and California has banned all open air pits, requiring enclosed tanks for wastewater storage.

Addressing Two Main Concerns

There are two main water concerns when it comes to fracking: freshwater used for drilling and wastewater produced during the process. The only solution that addresses both of these problems simultaneously is for operators to implement their own water treatment plans and to recycle the water they treat. In doing so,

they eliminate the need for wastewater disposal while at the same time providing their own source of clean water, reducing or eliminating the need to withdraw from local aquifers. Water recycling also satisfies every regulation that has been passed thus far and will likely satisfy any future legislation.

Further compounding the benefits of treating water and reusing it is that it provides increased efficiency for drillers. When a new well is drilled, freshwater is obtained and infused with chemicals and proppants (sand particles) to engage the fracking process. Once the chemically infused water has been injected into the well and the fracking commences, it immediately begins flowing back to the surface, which continues for several days. This is known as flowback.

As a well begins to produce oil, produced water begins to flow to the surface along with



Above right: The ITS both removes suspended solids and disinfects the water.

Below: The mobile chemical treatment unit prepares the water for physical separation.





the oil. This water is primarily composed of natively occurring water, called bound water, at the depth of the well, 10,000 ft below ground. Produced water typically has been regarded as unusable for drillers because of its incredibly high salinity, many times that of seawater.

In today's most common practices of deep well disposal, both flowback and produced water are simply disposed of in deep injection wells, never to enter the eco-cycle again. Fortunately, proper water treatment can remove all pollutants from flowback and produced water, enabling it to be used in new fracking operations, again and again.

The real magic happens with produced water. Though its high salinity has long been blamed for its ineffectiveness in generating frac fluid, the real reason why it has not worked in the past is that it contained relatively high levels of solid contaminants. If produced water is treated properly, these solids can be removed, leaving clean but very saline water behind, which is actually good for the well. Research performed by Halliburton and XTO Energy shows that when this water is used for fracking, the productivity of the well can increase by about 20%.

The reason treated produced water is ideal for fracking is a scientific one. Many shale formations where fracking takes place contain heavy deposits of clay. When freshwater is used, the water interacts with the clay and causes an osmotic imbalance. As a result, the clay swells. This causes the fissures created by the frac to close and reduces the amount of oil and gas that can escape

from the pockets in the formation, inhibiting overall productivity. In effect, treated produced water can act as a clay stabilizer.

Chemical Treatment

Water treatment options are growing and there are many competing technologies. Chemical treatment is an effective approach to processing frac water for reuse because it is highly customizable to the specific shale formation. Drillers adjust the chemicals they use for each frac based on a number of factors, including the geology of the formation. Additionally, the composition of produced water differs by location. This makes a "one-size-fits-all" solution impractical. Chemical treatment is flexible enough to be customized to treat frac water in an economically justifiable manner.

Water treatment technology has progressed to the point where flowback and produced water can be reused effectively for hydraulic fracturing. It enables energy operators to increase well productivity while at the same time be responsible stewards of natural resources and can be a substantial boon for the industry. Whether more drillers implement water treatment programs voluntarily or in compliance with regulations, it can be expected to become a standard in how fracking is carried out over the next several years. **iwwd**

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