New Mobile On-Site Technology Cuts Cost of Treating Flow-Back Water from Fracturing Operations

Operated at the well head by service providers, turnkey water treatment systems reduce the cost of cleaning frac' water by as much as 50%

The natural gas industry is a heavy user of water since water is an essential component of the drilling and hydraulic fracturing, or fracking, process. Taking a lesson from other industries that treat their wastewater on-site rather than paying to transport and dispose of it elsewhere, gas producers are now employing mobile service providers armed with the latest Integrated Treatment Systems (ITS™) to clean flow-back and produced water from fracturing operations at the well head. This water – cleaned to as low as 3 NTU – can then be re-injected back into the well without fear of environmental harm.

This new business model can cut the average cost of treating produced water by as much as 50% while allowing drillers to focus their efforts and manpower on generating oil and gas profits, rather than on water treatment.

Traditional on-site water treatment

With the cost of ever scarcer water supplies rising to new heights, a solution to the long standing issue of separating oil and contaminants from produced water has attained greater urgency. At the same time, traditional technologies can barely keep pace with today's more stringent environmental standards for treating and reusing water.

"Typically, drillers inject up to 600,000 gallons during the drilling operation and an additional 4.5 million gallons during the fracking operation. Approximately twenty percent flows right back out and needs to be treated," says Eli Gruber, CEO of Ecologix Environmental Systems, LLC, an Alpharetta, GA provider of complete processed water and industrial wastewater treatment solutions. "Drillers are constantly seeking ways to reduce their cost and at the same time maximize the quality of the effluent water."

One of the more popular attempts involves the capital-intensive use of frac-tank farms, encompassing as many as two dozen tanks. Electro-Coagulators help speed the process, but it still takes time for the sludge to settle before the oil eventually floats to the top and gets pumped off. Additionally, the oil producer must pay a crew to enter the tank with a pressure washer and scrape out all the leftover sludge, collect it, and then haul it away.

Some petrochemical operators employ large scale plants that treat the water using baffles or separators. These provide an effective mechanical means of separating out oil and some contaminants, but incur high capital expenditures to build and operate.

The use of evaporation lagoons or ponds is also still encountered. Here, the evaporation of the water takes exceptionally long. These also pose a high environmental risk to wildlife and local aquifers as liners occasionally leak and contaminate the surrounding areas.

But ultimately, lagoons suffer the same fate as tank farms and separator plants in that the water must still be moved to an off-site location.

"In every case, producers are saddled with the high costs of moving water and that's taking a big bite out of their profits," says Gruber. "Dozens of trucks come in every day, load dirty water, dump it at a distant location, then load fresh water and haul that back to the drilling site. The cost ranges from $100-150 an hour depending on the distance driven and how long the truckers have to wait in line while the clock keeps running."

An at-the-source solution

New innovations in treating produced water within a very small footprint have opened the door to bringing wastewater treatment to the source. Today's Integrated Treatment Systems (ITS) by Ecologix are pre-fabricated on moveable skids, or truck trailer, with all the necessary controls, piping, valves, instrumentation, pumps, mixers and chemical injection modules. These mobile systems are now specifically designed to process flowback water from natural gas hydraulic fracturing or produced water from oil drilling well heads.

Such systems essentially remove all the oil and other hydrocarbons, suspended solids, and dissolved metals from the frac water through the tightly controlled use of chemistry, separation, and filtration technology.

The integrated treatment process begins by treating the water chemically with a coagulant, after which the water enters a series of coalescing tubes where solids join together and build increasingly larger polymer chains.

Accounting for the greatest gains in treating high volumes of wastewater within a compact space is an innovative process called ACE. Patent pending by Ecologix of Alpharetta, GA, this new generation of water treatment systems clarifies wastewater through a process that mixes the wastewater under high pressure with air and special chemistry and then releases it all at atmospheric pressure in a basin. As a result, suspended solids and other matter float immediately to the surface and can then be automatically removed from the system by a scrapper mechanism. Additionally, any oil collected with the solids can be harvested for resale.

The clear water is then moved through one extra level of polishing with filters to remove any leftover solids. This final step can lower turbidity levels of 530 NTU down to as low as 3 NTU, which is the same clarity as drinking water. Field tests have demonstrated that Total Suspended Solids (TSS) have been removed by as much as 99.98%.

The future is in mobility

Given the benefits that mobile integrated treatment systems offer—note that one ITS unit can replace 6-12 settling tanks—these systems seem poised to take over processed water treatment duties from much slower and far costlier, traditional technologies.

An eighteen-wheeler deposits the ITS unit at the well head, pre-wired and pre-plumbed. Setup proceeds quickly using standard cam-lock style quick connects or ANSI flange connections. Power comes from a mobile generator or site-provided power source. Upon completion of drilling, a truck simply moves the rig to the next wellhead.

The end result is water clean enough to inject back into the frac site, at less than one half the cost of previous technologies.

For more information, contact Ecologix Environmental Systems, LLC; 11800 Wills Road, Suite 100; Alpharetta, GA 30009; (888) 326.2020; fax (678) 514.2106; sales@ecologixsystems.com; or www.EcologixSystems.com.

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