

CENTRALISE: FRACK INDUSTRY'S WATER TREATMENT SOLUTION

Centralised treatment of wastewater is emerging as a viable solution for long-term efficiency in managing water sourcing and wastewater treatment in hydraulic fracturing, explains Jeff Easton, Process Engineering manager at WesTech Engineering

The number of hydraulic fracturing (fracking) shale oil and gas wells in the United States and worldwide continues to increase. Within the Bakken Shale formation alone, in North Dakota and Montana, upwards of 15,000 hydraulic fracturing wellheads are in operation, with another 20,000 wells planned for opening.

The US has vast reserves of oil and natural gas that are commercially reachable as a result of advances in horizontal drilling and hydraulic fracturing technologies, which have enabled improved access to oil and gas in shale formations, such as the Bakken.

But as more hydraulic fracturing wells come into operation, so does the stress on surface water and ground water supplies from the withdrawal of large volumes of H₂O used in the process – needing up to one million gallons (almost 24,000 barrels) of fresh water per wellhead to complete the fracking process alone.

Equally important is the growing volume of wastewater generated from fracking wells, requiring disposal or recycling. Up to 60 per cent of the water injected into a wellhead (potentially 600,000 gallons) during the fracking process will discharge back out of the well shortly thereafter, as flowback wastewater. Thereafter, and for the life of the wellhead, it will discharge up to 100,000 gallons per day of produced wastewater.

This wastewater needs to be captured, and disposed of or recycled. Because water is the base fluid and biggest component used in hydraulic fracturing, its importance remains a critical factor in the operation and economics of shale oil and gas production. But significant



Hydraulic fracturing wells are on the rise

and growing water management challenges are impacting hydraulic fracturing.

Fresh water and wastewater operating procedures which have been in place since the late 1990s are experiencing increasingly stiffer governmental regulations on water availability and disposal limitations. These factors are prompting oil and gas executives to reassess their current water utilisation activities regarding fracking, and adopt a more unified, and longer-range perspective on their water lifecycle management.

One solution that promises a truly comprehensive approach to integrating all aspects of fresh water and wastewater management in shale oil and gas production, while optimising the utilisation of water resources throughout the entire lifecycle of well production, is a centralised approach to the treatment and reuse of wastewater.

Centralisation not only provides treatment

and reuse of flowback wastewater from a large number of wellheads when the wells are fracked, but also provides treatment and reuse of produced wastewaters for the long-term, full lifecycle of the wells – which represent the vast majority of wastewater flowing from wellheads. Further, a centralised system can more easily access and utilise alternative water sources, such as from municipal wastewater facilities, which otherwise would be highly unlikely to be accessed.

Inherently, wellheads providing shale oil and gas production are long-term processes, typically exceeding 20-year terms, but conventional solutions in play for handling fresh water resources and wastewater are geared towards the short-term. Impounding wastewater for evaporation in surface ponds, trucking water over long distances to deep-well injection sites, and treating flowback wastewater for reuse at the wellhead are all short-term wastewater handling

options which do not address critical long-term issues impacting the industry – such as diminished water sources, increasing regulations limiting wastewater disposal, and growing safety and environmental concerns from government and the public.

The centralised wastewater management concept is gaining momentum. In North America, well over a dozen centralised wastewater treatment facilities servicing shale oil and gas drilling are now either up and producing, or in development.

Centralised water management

Fresh water supplies for use in hydraulic fracturing are becoming more expensive and more unobtainable. Centralised treatment of wastewater is emerging as a viable solution for long-term efficiency in managing water sourcing and wastewater treatment in hydraulic fracturing. Centralised treatment facilities handle both the flowback wastewater and produced wastewater from oil and gas wells within a region, at a radius of 40 to 50

miles. Pipelines connect all wellheads directly with the central treatment plant.

Wastewater received by the plant is identified as originating from a specific well. The targeted usage requirements for that wastewater are specified, then the wastewater is processed to meet that usage. Once processed, the wastewater is then piped directly to the targeted well site.

Central wastewater treatment facilities are in a better position to provide a broader scope of treatment options than what would be available otherwise, such as with mobile wellhead treatment plants. They can provide a just-in-time processing capability, whether it is for a slickwater application in a well, or suitable for discharge to a watercourse.

Such centralised plants can be integrated with alternative sources of water to supplement fresh water needs for fracking, such as from abandoned mines, storm water control basins, municipal treatment plant effluent, and power plant cooling water.

The development of an integrated infrastructure for water management in shale

oil and gas production has lagged behind improvements in drilling technology, which have been successful in spearheading this industry into recent national prominence.

In the face of increasingly constricting traditional water sourcing options and tightening wastewater treatment regulations, the need for an industry initiative to develop this infrastructure network to deal with these water related issues is of critical importance if oil and gas producers are to effectively manage their frack well operations and maximise profits.

Centralised water management allows wastewater processing to be implemented on an economy of scale that has not before been realised in the shale oil and gas production industry. Reduced capital costs for treatment and distribution systems, lower operating costs, and a more favorable position to garner public and governmental acceptance are the key benefits of this centralised approach to water management.

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