

Progressive Cavity Pumps Move Clarifier Underflow

By Daniel Lakovic, seepex, Inc.
 & Upstream Pumping Solutions Editorial
 Advisory Board

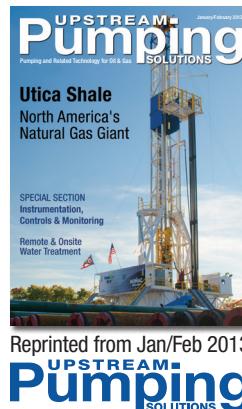
A Mt. Pleasant, Pa., facility finds success with hydraulic fracturing water treatment.

Gas production using hydraulic fracturing is growing across the U.S. production fields including the Marcellus, Utica and Huron basins in the east, the Haynesville in the south and the Bakken in the Dakotas. However, hydraulic fracturing presents several challenges. Water constitutes about 90 percent of the liquid media used in hydraulic fracturing. Fresh water supplies are often limited in production areas. With an increase in environmental and transportation (trucking) controls, the operating companies must incorporate water treatment and reuse into their business models.

Background

A facility formerly known as American Video Glass Co., which was wholly owned and operated by Sony Corporation, had been in operation in Mt. Pleasant, Pa., for several decades before closing its doors in 2004. The facility was sold to Commonwealth Renewable Energy,

Inc. in 2006, which planned to use the facility to produce ethanol. That project fell through in 2008. In 2009, the plant was permitted and converted to treat water used in hydraulic fracturing in the Marcellus Shale gas fields. The rehabilitated plant was opened in April 2010.



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Challenges of Restoration

Andy Kicinski, P.E., president and CEO of Reserved Environmental Services, LLC (RES), realized the plant's potential for treating hydraulic fracturing water. Working with a pump distributor, Kicinski was able to put the needed equipment together to get the plant up and running.

This plant had been shut down for half of a decade before Kicinski bought it. It had dead animals, rusting machinery, broken piping, pumps and instrumentation cluttering the facility grounds.

Kicinski was faced with remediating an abandoned water treatment facility that was left without proper decommissioning for potential reuse. No process was available for treating the hydraulic fracturing water. With 25 years of experience as a consultant and experience with U.S. Filter, he devised a plan for refurbishing the treatment plant. The fluids (hydraulic fracturing liquid) arrive on trucks, which unload into large holding tanks. The wastewater is then chemically treated for metals and the removal of other



Progressive cavity pumps used to transport flocculants

pollutants within large clarifier tanks. From there, progressive cavity (PC) pumps move the clarifier underflow or sludge to a proprietary dewatering system that Kicinski designed.

Why Use a PC pump?

Kicinski previously worked with progressive cavity pumps at a treatment facility in West Virginia and was familiar with their advantages. The PC pump consists of a single-helix metal rotor turning inside a double-helix elastomeric stator. The cavities transport fluid without shear or emulsification. The sealing line between the rotor and stator separates each cavity and handles solids, liquids, gases or any combination of the three.

The clarifier underflow often contains high-salt liquids and highly abrasive solids—including sand. For use in the RES treatment plant, the pumps also needed to be chemical resistant to a 120,000 parts per million chloride content. Therefore, the rotor and all other wetted parts were machined from duplex stainless steel.

The pump also had a hastelloy mechanical seal to withstand the higher corrosion levels. The rotor was ductile chromium coated to withstand the increased abrasion often



Right view of a PC pump that transfers the clarifier underflow or sludge to the dewatering system

seen in this type application. Kicinski also ordered several PC pumps for pumping flocculants.

A representative from the pump distributor said that the PC pumps produced the same pressure as four-stage pumps but were much smaller and less expensive than other designs. The pumps were outfitted to use a standard hydraulic motor, which decreased downtime. This type PC pump can also be used for oil and gas completion applications, water well drilling and grouting rigs. They can also be used to pump explosive emulsions into drill holes for blasting.

What's Next?

"Trucks are arriving from a 60-mile radius, but we have had trucks delivering water from as far as 80 miles away," says Kicinski. The treatment plant has a 30,000-barrel-per-day (1.2 million-gallon-per-day) capacity and a 30-minute unloading/recycle process turnaround time.

RES is a zero liquid discharge facility where 100 percent of the treated water is returned to the shale gas production field. The pumps have been in trouble-free service since April 2010, supporting one of the fastest growing shale gas production areas in the country.



Left view of a PC pump showing the clarifier connection and transfer hose going to the dewatering system



Daniel Lakovic holds a BS in International Business from Wright State University. He has worked for seepex, Inc. for two years, performing roles such as marketing management, pump development, rental pump program and special events. He is also a member of Upstream Pumping Solutions' Editorial Advisory Board. Lakovic can be reached at dlakovic@seepex.net.