

PRETREATMENT CORNER

Marcellus Shale Highlights from PennTec Conference

By Judy F. Musselman, QEP

The PWEA Industrial Waste Pretreatment committee organized and moderated a full-day session at the PennTec Conference in State College in June. Below are some highlights of the presentations. The speakers varied from regulators to watch groups to consultants to gas company representatives, which gave us a wide perspective of the Marcellus shale gas well operations currently underway within our Commonwealth.

From a regulatory perspective, there are effluent guidelines for the oil and gas extraction category at 40 CFR §435. However, per these regulations, no direct discharges to surface water are allowed and there are no categorical pretreatment standards for indirect discharges to POTWs, other than the POTW's local limits and the discharge prohibitions found at 40 CFR §403.5. Off-site disposal at centralized waste treatment facilities is also an option for gas drilling wastewaters but the effluent guidelines for the Centralized Waste Treatment Category at 40 CFR §437 do not address the pollutants of concern in frac flow back wastewater, such as Chloride and TDS. A POTW would need to develop local limits to address Chloride and TDS and any other pollutants of concern in the gas drilling wastewater if the facility chooses to receive such discharges.

The most likely impacts to a POTW from gas well frac wastewater are interference to the biological treatment system and pass through to the receiving stream, which may affect aquatic life. In most cases, the frac wastewater needs to be pretreated to remove the high TDS and other pollutants before being introduced into a POTW treatment plant.

Each gas well may use from 4,000,000 to 7,000,000 gallons of water during the drilling process for a single well. Approximately 500,000 to 1,000,000 gallons of this water used is returned as flow back. Other sources of wastewater from gas well drilling operations include drill pit wastewater, produced brine, waste drill mud and secondary containment water. While some flow back can be filtered and blended with fresh water for reuse, there is still a need to treat the remaining wastewater. Gas well operators have concerns over storage of the frac wastewater onsite. Frac tanks and impoundments are expensive to construct and maintain at a well site and the sooner the wastewater is transported offsite the better for the public and the environment.

Treatment technologies being explored for gas well frac wastewater include, but are not limited to, brine crystallization, evaporation, ion exchange, reverse osmosis membrane desalination, reversible cation exchange membrane, nanofiltration, carbon adsorption, pressure filtration, and dissolved air flotation. Benefits of these treatment technologies reduces transportation costs, energy consumption and carbon dioxide emissions; and promotes reuse of water in the gas drilling operation.

There are water quality concerns that the Commonwealth's rivers and streams have a limited ability to assimilate additional TDS. Other areas of concern with gas drilling operations include potential leakage from pipe or liners for lagoons, stormwater overflow from lagoons, and transportation spills of wastewater or fuels. It is not only the common pollutants such as TDS that are of concern, but fracking chemicals are added during the drilling operation, and traces of these fracking chemicals are most likely contained in the frac wastewater.

From an economic standpoint, the Marcellus Shale is the second largest gas play in the world; with the thickest part of the Marcellus Shale being in the Northern Tier region of Pennsylvania. It has been estimated that there is sufficient oil in the Marcellus Shale to meet the demand for the entire world for 3 years or the United States for 15 years. The Marcellus Shale gas well drilling operations has had positive impacts on existing businesses in the Northern Tier region. However, one has to weigh the economic benefits with the concern for potential harm to the environment and discover a win-win solution for the public health, welfare and the environment.