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Wastewater Management

Regulatory Environment Still Evolving

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PITTSBURGH—Managing flowback, produced fluids, and other oil and gas wastewater continues to be a significant industry concern in light of ongoing federal and state regulatory activity.

In the Appalachian Basin's Marcellus Shale play, this is being exacerbated as a result of fewer newly drilled wells being available to reuse flowback and produced fluids because of low gas prices.

For example, the Pennsylvania Department of Environmental Protection estimates that in 2014, operators either directly reused or treated and recycled 98 percent of hydraulic fracturing wastewater and 86 percent of unconventional produced fluid. But operators' ability to maintain such high percentages for wastewater reuse and recycling will be challenged by decreased development. In 2015, 570 fewer unconventional wells were spudded in Pennsylvania than in 2014, a decrease of nearly 43 percent.

Additionally, several federal and state regulatory initiatives have emerged to make treatment potentially more costly, or at least more heavily regulated. At the federal level, the U.S. Environmental Protection Agency has proposed to prohibit publicly owned treatment works (POTWs) from accepting wastewater from unconventional wells for discharge or treatment. The agency also has begun a study of centralized wastewater treatment facilities (CWTs) to determine whether current regulations are sufficiently stringent.

Finally, the CWT industry could be affected by the findings of EPA's much-publicized hydraulic fracturing assessment, particularly in light of the EPA Science Advisory Board's recommendation that the agency include additional information regarding radioactivity.

At the state level, operators in Pennsylvania likely will be affected by pending amendments to the commonwealth's oil and natural gas regulations, several of which directly implicate the management of oil and natural gas wastewater.

Wastewater Treatment Regulations

Historically, operators have utilized both POTWs and CWTs to treat and/or dispose of wastewater generated by oil and natural gas production activities. The EPA has established technology-based effluent limitation guidelines (ELGs) for treating oil and gas wastewater at POTWs and CWTs, which are found in 40 CFR Parts 435 and 437, respectively. In the not-too-distant past, operators of shallow wells used POTWs to treat brine, but that practice is diminishing. For example, in May 2011, the Pennsylvania DEP directed operators to stop sending oil and natural gas wastewater to POTWs.

By contrast, use of CWT facilities has remained strong. By definition, a CWT is any facility that treats (for disposal, recycling or recovery of material) any hazardous or nonhazardous industrial waste and wastewater, and/or used materials received from off site. The definition of a CWT facility includes both a facility that treats wastes received exclusively from off site, and a facility that treats wastes generated on site as well as waste received from off site (40 CFR §437.2(c)).

According to EPA's March 2015 *Technical Development Document for Proposed Effluent Limitations Guidelines and Standards for Oil and Gas Extraction*, 73 CWT facilities either currently accept or plan to accept oil and natural gas extraction wastewater: 39 in Pennsylvania, 11 in Ohio, six in West Virginia, four each in Texas and Wyoming, three each in Arkansas and Colorado, two in Oklahoma, and one in North Dakota. Only two states–Pennsylvania and Ohio–have CWT facilities that discharge to a surface water or POTW.

POTW Amendments

40 CFR Part 435 contains the technology-based ELGs for the oil and gas extraction point-source category. Promulgated in 1993, these ELGs apply to offshore, onshore, coastal, and stripper operations.

Subpart C specifically regulates the onshore oil and gas extraction point-source subcategory, and prohibits the direct discharge into navigable waters of oil and natural gas wastewater pollutants associated with production, field exploration, drilling, well completion, or well treatment. This includes produced waters and drilling fluids.

Subpart E acts as an exception to Subpart C, and allows permitted direct discharges of produced water to navigable waters west of the 98th meridian, provided the produced water has use in agriculture or wildlife propagation.

Part 435 does not now address the indirect discharge of oil and natural gas wastewaters into navigable waters through POTW treatment and discharge. However, on April 7, 2015, EPA proposed to amend Subpart C to prohibit discharging unconventional oil and gas wastewater associated with unconventional production, field exploration, drilling, well completion, and well treatment to POTWs.

The proposed rule making is unlikely

to have a significant effect on the unconventional industry, however, because as EPA notes in the preamble, the prohibition reflects current industry practice. In fact, the agency states that it did not identify any unconventional operators discharging to POTWs during its site visits and contacts with treatment facilities and vendors.

EPA Wastewater Study

40 CFR Part 437 contains the technology-based ELGs for the CWT point-source category. Part 437 consists of four subparts:

- Subpart A, metals treatment and recovery;
- Subpart B, oils treatment and recovery;
- Subpart C, organics treatment and recovery; and
- Subpart D, multiple waste streams.

For example, Subpart B applies to CWTs that treat wastes or used materials that contain oil and grease from commercial operations, including oil/water emulsion, contaminated groundwater from cleaning petroleum spills, and tank cleanout waste from petroleum or oily sources.

If the CWT facility accepts more than one type of waste stream, it may opt to fulfill the requirements of Subpart D, which sets effluent limits for a more extensive list of parameters than any subpart individually, or the individual subparts applicable to each waste stream accepted by the facility.

In June 2015, EPA released its *Final 2014 Effluent Guidelines Program Plan*, in which the agency announced that it had commenced a detailed study of the CWT industry to determine whether Part 437 ELGs should be amended. The *Program Plan* states that EPA plans to evaluate:

- The number and types of facilities accepting oil and natural gas extraction wastewaters;
- The technology used to treat these wastewaters, their performance, and costs;
- The financial characteristics of the industry;
- The environmental impacts of CWT wastewater discharges; and
- Current practices for managing treatment residuals.

As part of the study, EPA plans to visit CWT facilities accepting conventional and unconventional oil and gas wastewater, and to sample wastewater and treatment residuals at such facilities to "evaluate the pollutants present, their concentrations, and the performance of treatment technologies." EPA has expressed concern that today's effluent regulations do not include limitations for dissolved solids, barium, bromide, radium, and strontium.

In its response to public comments on its preliminary 2014 effluent guidelines, EPA stated that it would evaluate all Part 437 facilities that accepted oil and gas wastes. The agency also intends to evaluate treatment facilities not subject to 40 CFR Part 437, such as no-discharge facilities that accept oil and gas wastewater for treatment.

Significantly, EPA anticipates the study may also include various types of wastewater management facilities, including both on- and off-site facilities, and facilities owned by oil and gas extraction companies in order to "explore whether existing definitions for CWTs at 40 CFR Part 437 are clear enough to address facilities across the oil and gas extraction industry that are accepting wastes for discharge."

Industry Response

The American Petroleum Institute challenged the agency's plan to potentially evaluate wastewater facilities owned by oil and gas extraction companies. API argued that the definition of centralized wastewater treatment in the regulations did not include facilities that were owned or operated by companies within the petroleum industry.

API also commented that EPA's study might not include wastewater management facilities that were not CWTs. EPA responded that wastewater treatment facilities owned by exploration and production companies should be evaluated because:

- The agency expected many producers owned, operated, or leased wastewater treatment systems that might discharge to POTWs or to surface waters.
- Amendments to 40 CFR Part 437 might alter the cost of CWT services for extraction companies.

It appears, therefore, that EPA may examine operator wastewater management facilities, including facilities that do not directly or indirectly discharge to navigable waters, as part of its larger study of the CWT industry.

Hydraulic Fracturing Study

On June 4, 2015, EPA released its *Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources*, a draft assessment that discussed the potential effect of hydraulic fracturing activities on drinking water resources. The draft assessment discusses both POTW and CWT treatment of oil and natural gas wastewater.

With respect to POTWs, the assessment states that such facilities are not designed to effectively reduce the concentration of total dissolved solids present in highly saline oil and gas wastewater, even though the facilities may effectively remove some constituents.

With respect to CWTs, the draft assessment summarizes the concerns of some researchers that ineffective treatment of oil and gas wastewater has led to elevated radium concentrations in the effluent of certain CWT facilities. The studies cited by the draft assessment note that radium can accumulate in sediments and soils affected by the outfalls of some treatment plants that have handled oil and natural gas wastewater.

On Jan. 7, the EPA's Science Advisory Board released its *SAB Review of EPA's Draft Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources*. The review recommends that EPA revise its draft assessment to:

- More clearly summarize the statutory and regulatory framework for CWT oversight;
- Improve the description of the processes used to treat wastewater at CWT facilities; and
- More adequately describe the composition and disposal methods of treatment residuals.

The SAB also challenged EPA to forecast the future treatment volumes of CWT facilities, paying special attention to cost and wastewater reuse patterns.

The SAB report was particularly critical of the *Draft Assessment's* conclusion that POTWs receiving wastewater from CWT facilities did not show higher radionuclide concentrations in the effluent than POTWs not receiving such waste streams. SAB believes EPA should have stated that the reported waste streams were all elevated beyond the maximum contaminant levels and several orders of magnitude above background river levels.

Anticipated Developments

Several developments in the area of federal oil and gas wastewater management are expected this year. First, EPA projects that its proposed Part 435 rule prohibiting POTWs from treating or disposing unconventional wastewater will be finalized in August.

Second, operators and CWT facilities alike should follow closely EPA's ongoing study concerning the scope of Part 437, because it may spark additional regulatory actions that directly affect the management and treatment of conventional and unconventional wastewater.

Third, the SAB's review of EPA's assessment of hydraulic fracturing's impact on drinking water resources suggests the agency may re-examine its draft conclusions concerning potential radioactivity of POTW and CWT effluent. These latter two developments may eventually result in ad-

ditional regulation of oil and natural gas wastewater management.

State Regulations

Two states, Pennsylvania and Texas, have adopted regulations to control the permitting of CWT facilities. The Pennsylvania DEP permits CWT facilities through its WMGR123 general permit, which allows facilities to treat wastewater and send it back into the field for reuse in development operations. The DEP also has adopted its own technology-based treatment regulations for industrial wastes, which include wastewater generated by oil and gas activities. These regulations are codified at 25 Pa. Code §95.10.

Under §95.10, new and expanding discharges of wastewater resulting from fracturing, production, field exploration, drilling or completion of natural gas wells may be authorized only from CWTs, as defined by EPA's regulations in Part 437. Oil and gas operators must maintain and update annually a wastewater source reduction strategy that identifies the methods and procedures the operator will use to maximize recycling and reuse of flowback and production fluids.

This source reduction strategy must include:

- A complete characterization of the operator's waste stream, including chemical analyses, TDS concentrations, and monthly generation rates of flowback and production fluids at each natural gas well;
- A description and evaluation of potential wastewater source reduction options through recycling, reuse, and other permitted beneficial uses;
- The rationale for selecting the source reduction methods employed by the operator; and
- Quantification on a per well basis of the flowback and production fluid recycled or reused to fracture other natural gas wells, or for other approved beneficial uses.

Pennsylvania CWT facilities discharging to surface waters or POTWs must meet EPA's Part 437 new source performance standards to comply with the state's regulation in §95.10(b)(3). Specifically, the discharge may not contain, as a monthly average, more than 500 milligrams per liter of TDS, 250 mg/l of total chlorides, 10 mg/l of total barium, or 10 mg/l of total strontium.

Section 95.10 also prohibits the discharge of oil and natural gas wastewater from POTWs unless CWT pretreatment meeting these requirements has occurred.

On Feb. 3, the Pennsylvania Environmental Quality Board approved revisions to the commonwealth's oil and natural gas regulations, which if ultimately adopted, will impose significant operational consequences for managing flowback and produced fluids (see related story, page 80).

Some significant changes include:

- Prohibiting the use of pits in unconventional operations;
- Registration requirements for new underground storage tanks;
- Required secondary containment for certain mixing, aerating, and filtering operations; and
- Prohibiting the use of centralized impoundments.

Texas System

The Texas Railroad Commission requires operators transporting, hauling, storing, discharging, disposing or recycling oil and natural gas waste to have, at a minimum, an active organizational report on file with the RRC. Rule 8 authorizes certain fluid recycling activities on commission-designed leases or drilling units associated with a drilling permit. Wastewater management activities that occur off lease or on a lease other than the lease where the wastewater was generated must be authorized by a permit.

The RRC regulates and categorizes CWT facilities depending on whether they are capable of being moved from one location to another (off-lease), or are stationary. A permit under Division 5 authorizes off-lease fluid recycling for a maximum of two years. A permit under Division 6 authorizes a stationary facility for up to five years.

The Railroad Commission also issues permits for discharging produced water to inland waters for agricultural and wildlife use (an additional EPA permit may be required for discharges east of the 98th meridian). Applications for the permit must include information on wastewater treatment methods and a "produced water analysis" that demonstrates attainment of general parameters and toxic pollutant limitations. ❐

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