

The Legal Intelligencer

THE OLDEST LAW JOURNAL IN THE UNITED STATES 1843-2010

PHILADELPHIA, THURSDAY, SEPTEMBER 16, 2010

VOL 242 • NO. 54

An **ALM** Publication

ENVIRONMENTAL LAW

Pennsylvania's Regulation of Total Dissolved Solids

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Special to the Legal

On Aug. 21, the Pennsylvania Environmental Quality Board (EQB) published regulations in the Pennsylvania Bulletin establishing new wastewater treatment requirements for Total Dissolved Solids (TDS). These new effluent standards and requirements will have significant impact on new and expanding sources of high strength TDS, and in particular wastewater from the natural gas development industry. The goal of the regulation is to ensure that the concentration of TDS in Pennsylvania's streams does not exceed the water quality criterion of 500 milligrams per liter (mg/L).

THE TDS PROBLEM

The term "TDS" includes a variety of materials dissolved in water such as inorganic salts, metals and organic materials. TDS begins to cause aesthetic problems, but not human health effects, when drinking water concentrations reach the secondary (recommended) maximum contaminant level established by the U.S. Environmental Protection Agency, 500 mg/L. TDS may cause toxic effects to humans when ingested at higher concentrations. Salinity may also injure aquatic organisms.

According to the EQB, many Pennsylvania streams are impaired or are at the risk of becoming impaired, on account of instream concentrations of TDS exceeding or approaching 500 mg/L. Some of the more serious TDS impairments have captured headlines. For example, in 2009, elevated concentrations of TDS in Dunkard Creek, a tributary to the Monongahela River, led to the colonization and growth of green algae and extensive osmotic pressure within the creek. These conditions destroyed much aquatic life, including numerous species of fish and endangered and other mussels, within at least a 26 mile reach of the creek.

Adverse effects from TDS have been documented in other waterbodies within



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Pennsylvania. In 2008 at seasonal low flow, concentrations of TDS and sulfates at public water supply intakes on the Monongahela River exceeded water quality standards. An EPA study found a strong correlation between formation of toxic trihalomethanes in drinking water systems and elevated bromide concentrations in the Monongahela River caused by TDS discharges to surface waters. Pennsylvania intends to list the Monongahela River as an impaired waterway.

Existing wastewater treatment systems and wastewater disposal practices are capable of removing some metal components of TDS, but traditionally manage salts and other constituents by diluting them in the receiving stream. The EQB emphasized that dilution is insufficient to protect water quality for existing and designated uses such as drinking water, recreation and industrial processes. In some streams, ongoing sources of TDS including mine drainage, storm water runoff and industrial discharges are likely to leave the streams with little or no assimilative capacity for TDS for years to come. The EQB therefore concluded that if new or expanded discharges are to be allowed, control of TDS loadings is necessary.

NEW TDS REQUIREMENTS

The EQB elected to control TDS by focusing on waste streams with high concentrations of TDS. With respect to sectors other than the natural gas development industry, the EQB concluded that stringent end of pipe TDS load

limitations could not be achieved cost effectively. To control TDS discharges from these sources, the EQB selected what it termed a "watershed approach" that regulates all dischargers to a stream the same, regardless of their discharge location. The EQB reasoned that inorganic TDS is a conservative parameter that does not degrade as it flows down stream. Because new loadings are cumulative, uniform requirements are appropriate.

Under the new rules, an effluent standard of 2000 mg/L as a monthly average applies to new and expanding loadings from non-exempt dischargers outside the natural gas development sector. Most dischargers can meet this standard without employing new technology or constructing new facilities. Discharges from municipal wastewater treatment plants and most industrial facilities ordinarily fall under this threshold. In addition, increased net loadings of less than 5,000 pounds per day as an annual average daily load are considered de minimis and exempt from the rule.

The new rules apply only to new and expanding loadings of TDS, not to existing loadings. Therefore, those dischargers with existing wastewater concentrations in excess of 2,000 mg/L will not be required to reduce their existing mass loadings. Existing loadings are those authorized by the National Pollutant Discharge Elimination System (NPDES) permits or other authority issued before Aug. 21. A discharge is deemed authorized if the Pennsylvania Department of Environmental Protection (PADEP) reviewed an application containing TDS or conductivity data, whether or not PADEP imposed a limitation or monitoring requirement for TDS.

If a discharger does not expand, or if it moves or combines its discharge points without increasing its loadings, the new rules do not apply to the discharge. If and when a treatment facility discharges a new loading, only the net increase in mass loading of TDS, not the existing loading, is subject to the new limit. The new rules also contain specific exemptions for certain mining and related activities and for industrial categories subject

to federal effluent limitation guidelines for TDS, chlorides or sulfates.

If a new or expanded loading would be subject to the 2,000 mg/L standard, PADEP may nonetheless approve a higher loading under the variance provisions of the new rule. To obtain a variance, the discharger must characterize its wastewater, describe the available treatment technologies, estimate the costs that it would incur in meeting the 2,000 mg/L standard and analyze the receiving stream's water quality for TDS. If PADEP concludes that sufficient assimilative capacity remains in the receiving waterbody, it may approve the variance. More technically stated, a variance will not be granted if the discharge would reduce the assimilative capacity for TDS at the most proximate downstream public water supply intake to less than 25 percent of the stream's assimilative capacity at low flow (Q7-10 conditions), or if the discharge would violate water quality standards. PADEP may develop a wasteload allocation where the remaining assimilative capacity of a receiving stream falls below 25 percent. Before a variance is granted, public notice as required by the NPDES program must be given.

THE NATURAL GAS SECTOR

In contrast to the flexible watershed approach applicable to most dischargers, the EQB adopted a stricter approach for the natural gas sector. This approach includes an effluent standard, a requirement that wastewater be sent to a centralized waste treatment (CWT) facility before it is discharged to a stream, and a process to encourage recycling and reuse of the wastewater.

Natural gas wastewater must meet the more stringent wastewater discharge standard of 500 mg/L as a monthly average at the end of pipe discharge point. The EQB explained its decision to impose different rules on this sector on the ground that wastewaters from extraction of natural gas contain higher concentrations and loadings of TDS than other wastewaters. The EQB stated that the development of the Marcellus Shale play poses the primary threat to the quality of streams impacted by TDS. The EQB anticipates that the concentration of TDS contained in flow back and production waters will exceed 300,000 mg/L, thereby distinguishing this sector.

The EQB similarly noted that EPA regulations impose sector specific requirements to drive technology. Although the new rules contain sector-specific requirements for the natural gas industry, they do not drive the technology. Rather, the most cost-effective technology, evaporation/distillation, reduces TDS concentrations far below the protective discharge limit of 500 mg/L. Selection of a

higher effluent limit would not alter the technology used.

The EQB concluded that this standard for the natural gas sector was economically viable. Because other states either prohibit natural gas wastewater discharge entirely or impose the same standard as the EQB adopted, no competitive disadvantage will be created. The EQB estimated the treatment costs to the natural gas sector at less than 25 cents per gallon, or in the aggregate, less than 0.4 percent to 0.8 percent of the sector's anticipated annual revenue. Innovation may reduce that cost.

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In contrast, the EHB found that the absence of controls on natural gas wastewater could adversely impact other industrial users who might be compelled to treat their intake water to render it acceptable for industrial use. Likewise, in the absence of controls on natural gas wastewater discharges, public water systems might incur significant expense to install technology capable of treating TDS.

The EQB rejected an approach called "real time management" that certain natural gas and other stakeholders advocated. Under this approach, a consistent standard would not be established based on low flow design conditions, but rather sources would be allowed to discharge concentrations calculated on the basis of actual river flow. The higher the flow, the greater the loading allowed. The EQB noted that a stream's water quality criteria is developed not only based on the magnitude of pollutants, but also on the frequency and duration of their concentrations in the waterbody. The EQB concluded that a real time management system would be inconsistent

with the frequency and duration components and may harm aquatic organisms.

The new rule requires all natural gas wastewater to be sent to a CWT to remove TDS before discharge to a stream. Municipal sewage treatment plants have limited ability to remove TDS, and TDS may interfere with the biological treatment processes. Consequently, the rules prohibit these facilities from accepting natural gas wastewater unless the wastewater has first been treated at a CWT. The EQB noted that two CWT facilities have already received approval, Terraqua Resource Management in Williamsport, Pa., and Somerset Regional Water Resources in Somerset, Pa.. At least 29 additional applications are under review. The new rules continue to allow disposal of wastewater by deep well injection, if performed in accordance with existing requirements in 25 Pa. Code § 78.18.

The rules also require each natural gas well operator to develop a wastewater reduction strategy by Aug. 22, 2011, and to update the strategy annually. Flow back and production waters may be reused for well fracturing or other beneficial uses. It may also be possible for CWTs to recycle the salts removed from the wastewater. By some estimates, each natural gas well may produce 27 tons of salt per year, and tens of thousands of wells are anticipated to be installed.

In sum, the new rules comprise a significant step in controlling degradation of the commonwealth's streams from TDS. With respect to sectors other than the natural gas sector, by exempting existing discharges and certain classes of facilities, and allowing for variances to be granted where sufficient assimilative capacity exists, the rules establish a standard that most dischargers can meet. The natural gas sector is subject to a more stringent standard, but one that can be met with existing technology. It remains unclear whether this sector will accept the new standard on account of its regulatory certainty, or will challenge it as inconsistent with the treatment of other sectors and on other grounds. With or without a challenge, it remains to be seen whether the regulations meet the EQB's goal of guaranteeing that the concentration of TDS in the commonwealth's waters does not exceed 500 mg/L. •