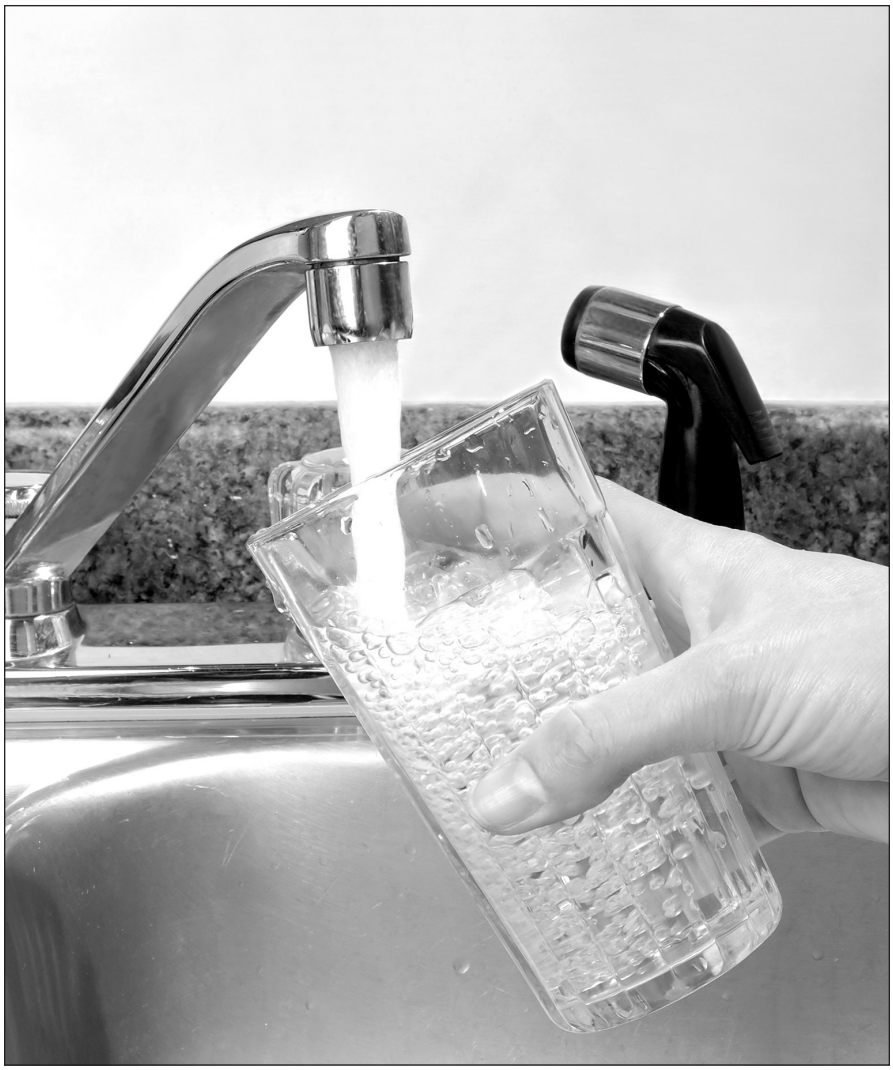
Shaping Proposed Changes to Pennsylvania's TOTAL DISSOLVED SOLIDS STANDARD

A Guide to the Proposal and the Commenting Process

We all have a stake in sound public policies for water management.

Changes are being proposed to the total dissolved solids (TDS) treatment standards to protect Pennsylvania's streams, rivers, lakes, and public drinking water. This publication provides a basic description of TDS, the history of the current standards, and the reasons for the proposed changes. It also indicates how the public can have a voice in shaping the proposed changes.



Should I Comment on the Proposed Regulations?

- **Are you concerned about high-quality and affordable water supplies for your home or business?**
- **Do you fish, boat, or camp on or near Pennsylvania's streams, rivers, and lakes?**
- **Are you concerned about the economic viability of industries such as oil and gas, coal mining, or pharmaceuticals that will be affected by new high-TDS wastewater regulations?**
- **Are you concerned about the quality of life in your community?**
- **If you answered "yes" to any of these questions, then you have a stake in this decision! Now is the time to learn about the proposed regulations and comment on them before the public comment period ends (February 12, 2010).**

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INTRODUCTION

What Is TDS and Why Does It Matter?

Total dissolved solids (TDS) is a measure of dissolved matter (salts, organic matter, minerals, etc.) in water. Inorganic constituents comprise most of the total concentration of TDS. TDS can be naturally present in water or the result of mining, oil and gas drilling, or some industrial or municipal treatment of water (Table 1).

Under the Federal Safe Drinking Water Act, the U.S. Environmental Protection Agency (US EPA) classifies TDS as a secondary maximum contaminant level (sMCL). This means that there is a recommended maximum level of 500 milligrams per liter (mg/L), but no requirement that public water systems meet this level. Under the Pennsylvania Safe Drinking Water Act and associated regulations, however, secondary standards are enforceable. TDS is not expected to harm human health at the sMCL, although it may negatively affect water's taste. But elevated TDS levels may damage water treatment equipment or reduce the effectiveness of treatment for other contaminants. TDS can be toxic to aquatic life through increases in salinity or changes in the composition of the water, or it may include substances that are toxic to people or aquatic life.

Note that some constituents of TDS, such as arsenic, lead, and nitrate, can have health effects if they exceed drinking water standards.

Goals of This Publication

In this publication we highlight the major changes proposed in Pennsylvania in water quality regulations at this time (November 2009) and explain how you can make effective comments. It is important that you become familiar with the proposed regulations before commenting. Included here is information about:

Table 1. Constituents of TDS.

Common	*Less common*
calcium	strontium
carbonate	barium
bicarbonate	thallium
nitrate	arsenic
phosphates	lead
sodium	
sulfate	
chloride	
iron	
manganese	
magnesium	
aluminum	

- how to obtain a copy of the proposed regulations;
- how to submit comments;
- key proposed changes;
- the timetable for regulation development;
- tips for preparing comments;
- communicating and working with others.

DEP PROPOSES A TWO-TIERED APPROACH

The Pennsylvania Department of Environmental Protection (PA DEP) proposes a two-tiered approach to address TDS and related issues:

- Amendments to Chapter 95 of the Pennsylvania Code, which describes standards for wastewaters to be discharged to Pennsylvania waters. The proposed revisions will establish new standards for high-TDS wastewaters. In this publication we address the proposed changes to Chapter 95—effluent standards to protect public drinking water supplies. (Effluent is wastewater discharged to surface water.)
- Amendments to Chapter 93 of the Pennsylvania Code, which sets water quality standards for Pennsylvania's waters necessary to protect their designated uses, such as aquatic life and drinking water supply. The proposed amendments will set new effluent standards for discharges of chlorides. A forthcoming publication, expected early in 2010, will address the proposed changes to Chapter 93, which will set new ambient water quality standards for chlorides to protect aquatic life.

Provided that both proposed amendments become regulation, the stricter of the two standards will apply, although DEP says that the Chapter 95 standard will usually suffice to protect aquatic life.

WHY IS THE TDS STANDARD CHANGING?

Limited Ability of Some Waterways to Effectively Dilute TDS

Several factors influenced DEP's decision to pursue amendments to the state's TDS standard. The agency has determined that some of the state's waterways, including the West Branch of the Susquehanna River, have limited capacity to assimilate (i.e., dilute to acceptable levels) additional TDS and sulfates. In some cases this is because of existing sources of pollution such as acidic mine drainage. Agency staff obtained similar results for several other rivers and creeks in western Pennsylvania (Table 2). For example, in the Beaver River during low-flow conditions, TDS is already 90 percent of the 500 mg/L EPA–recommended drinking water standard. The river can accept only another 75 tons per day of TDS. DEP has calculated that the entire West Branch of the Susquehanna could assimilate up to about 500 tons of TDS per day.

Marcellus Shale Gas Extraction: A Significant New Source of TDS Loadings

Since 2008, Pennsylvania has experienced dramatic growth in drilling for natural gas in the Marcellus shale, which underlies about two-thirds of the state. Water

is a critical component in the process for removing gas from this underground shale rock formation. Water that has been used in this process may contain many pollutants of concern and is typically high in TDS (about 800–300,000 mg/L). (For comparison, ocean water typically has a TDS of about 35,000 mg/L, and fresh water typically ranges between about 100 and 500 mg/L TDS.) Many of the areas where Marcellus drilling is prevalent also are affected by acidic mine drainage from coal mines, which itself can elevate dissolved solids in waterways. Furthermore, as the industry expands, the demand for brine water treatment is expected to increase rapidly (see "Extensive New Treatment Capacity Needs Are Expected," below).

Leveling the Playing Field

Owing to the difficulty of pinpointing pollution sources in the face of water quality problems and the many industrial sectors whose wastewaters can include high TDS (e.g., public wastewater treatment facilities, pharmaceutical and chemical manufacturers, and the oil and gas and coal industries), DEP wanted to level the playing field by establishing an across-the-board effluent limit for TDS in wastewater. This would negate the potential advantage of siting treatment plants downriver, where dilution is greater, and would level the playing field for all industries in the state.

High TDS in the Monongahela River

In fall 2008, with reduced late summer-early fall flows in the Monongahela River in western Pennsylvania, concentrations of TDS (mainly chlorides and sulfates) in the river reached their highest recorded levels (up to about 925 mg/L). Thirteen public water system intakes from West Virginia to Pittsburgh exceeded sMCLs established by the US EPA. Violations of water quality standards for TDS and sulfates persisted through November and December 2008. Elevated chloride levels were also observed in the Monongahela and on at least one major tributary—South Fork Tenmile Creek.

Since the occurrence of elevated TDS in the Monongahela in late 2008, monitoring of the river's water quality has increased in the area, and much work has been done to isolate the source(s) of the high TDS in the Monongahela. DEP believes there were multiple contributing factors, but mining has long been and will continue to be a major water quality issue in that watershed. Known sources of high-TDS wastewater include mines (active, inactive, and abandoned), landfills, food processing, road salt, wastewater treatment plants, water softeners, oil and gas extraction, and others.

Table 2: Public water system (PWS) intakes and population served for selected Pennsylvania watersheds with limited capacity to assimilate additional TDS (August 2009).

Watershed	*PWS intakes in watershed*	*Population served*
Youghiogheny/Monongahela	26	1,057,405
Beaver River	7	147,258
Mahoning Creek	2	9,271
Moshannon Creek	3	29,871
Connoquenessing Creek	4	49,985
Slippery Rock Creek	3	18,202
Redbank Creek	5	12,153
West Branch Susquehanna	33	216,844
Total	**83**	**1,540,989**

Credit: PA DEP. 2009. Chapter 95—Wastewater Treatment Requirements, PowerPoint presentation by John H. Hines. www.depweb.state.pa.us/pubpartcenter/lib/pubpartcenter/eqb/2009/081809/chapter95proposedrulemakingtoeqb_da.pdf Accessed 9/3/09.

Meeting the Interstate Challenge of Water Quality Management

The Monongahela River incidents revealed the interstate challenges in managing water quality. The "Mon" originates in West Virginia,

which currently has stricter water quality standards than Pennsylvania does. The Susquehanna River, which drains much of Pennsylvania, originates in New York and flows from Pennsylvania into Maryland and the Chesapeake Bay. Interstate river basin commissions regulate water supply in central and eastern Pennsylvania, but not in western Pennsylvania. Industrial wastewater is sometimes transferred across state lines for disposal. Situations such as these complicate effective systemic management of water quality and quantity.

Extensive New Treatment Capacity Needs Are Expected

Initial industry estimates forecast the demand for disposal of high-TDS wastewaters in the state to increase from about 9 million gallons per day (MGD) in 2009 to nearly 20 MGD by 2011. Other TDS disposal means are needed because that amount of salt in this additional wastewater cannot be diluted in the state's waterways.

Despite any regulatory requirements, it is unclear whether any TDS treatment facilities will be available to treat these wastewaters at the start of 2011. TerrAqua Resource Management, LLC, the treatment company that is farthest along in the permitting process, does not expect its plant (proposed for Williamsport) to be operational until at least 2013, and that plant is expected to treat only 400,000 gallons of wastewater per day. The state would need about 50 facilities of that size to treat all the high-TDS wastewater expected by 2011.

WHY ARE NEW EFFLUENT DISCHARGE REQUIREMENTS NECESSARY?

The Monongahela River's water quality issues, the inadequacy of current water quality measures, and the expected large increases in demand for disposal of high-TDS wastewater led DEP to conclude that there was a need to establish effluent standards for TDS, sulfate, and chloride to protect drinking water uses of Pennsylvania's surface waters.

History of the TDS Standard in Pennsylvania

Pennsylvania's current TDS standard (500 mg/L) dates back to 1967. The U.S. Environmental Protection Agency's (US EPA) secondary Maximum Contaminant Level for TDS under the Federal Safe Drinking Water Act, which became effective in 1979, is set at the same level.

Interim Strategy

DEP currently has in place an interim "Permitting Strategy for High Total Dissolved Solids (TDS) Wastewater Discharges" to address new sources of high-TDS wastewater with the greatest potential to harm Pennsylvania waterways. Effective April 15, 2009, to December 31, 2010, new permits may be issued for discharges on streams and rivers where assimilative capacity exists. Under the interim strategy, permitted discharges will be allocated using mass loads of the water quality constituents in question. Where waterways have insufficient assimilative capacity, new sources will be allowed only if permit limits protect downstream water supply intakes. New high-TDS sources will not be permitted unless the applicant will install satisfactory TDS treatment facilities before the start of 2011. Beginning in 2011, all new sources of high-TDS wastewater will be subject to the new regulations.

PROPOSED CHANGES TO PENNSYLVANIA'S WATER QUALITY REGULATIONS

Chapter 95

There are no existing effluent standards in Chapter 95. The only way that TDS is currently managed in Pennsylvania is under the secondary MCL. New state discharge requirements for total dissolved solids are proposed to be effective January 1, 2011. Effluent standards apply to wastewater after it has been treated and before it is disposed of in a waterway. The proposed regulations do not specify the type of technology needed to meet these standards. By 2011, new wastewater sources (those not existing on April 1, 2009) with high TDS (TDS concentration of more than 2,000 mg/L or TDS loading of more than 100,000 pounds per day) will be prohibited from discharge to Pennsylvania waters if they do not meet these effluent standards. The Pennsylvania Clean Streams Law allows the development of a treatment-based management approach to address TDS.

The proposed effluent standards (daily maximums) to protect the quality of public drinking water supply sources are:

- 500 mg/L for TDS
- 250 mg/L for sulfate
- 250 mg/L for chloride

In addition, for wastewaters from the oil and gas industry, DEP also proposes the following daily maximum effluent standards:

- 10 mg/L for total barium
- 10 mg/L for total strontium

The regulations would also cover existing treatment plants that accept high-TDS wastewater. Generators of new or increased high-TDS wastewaters will incur new treatment costs. DEP estimates that it will cost about $0.25 per gallon to "construct and profitably operate"[1] a high-TDS treatment facility. Additional costs for existing facilities are expected to be minimal—for monitoring and record-keeping.

Provided they are not located in areas with water quality problems (e.g., the Monongahela watershed), existing sources of high-TDS wastewater and existing

pretreatment facilities may continue to operate as they have been, until "they propose to expand or increase their existing daily discharge load."[2] From that point, they will have two years to come into compliance with the new requirements.

Pretreatment

Public sewage treatment plants that accept oil and gas wastewater will be required to have a US EPA–approved pretreatment program. DEP has no authority over pretreatment of these wastewaters. Pretreatment occurs at a facility other than a publicly owned treatment works. Pretreatment, possibly in the form of a desalinization process, readies the wastewater to be adequately treated by a publicly owned treatment works.

Chapter 93

In related rulemaking, DEP has also proposed new instream water quality standards (resulting in water-quality-based effluent limitations) through revision to regulations in Chapter 93 for chlorides. These limitations will be specific to each wastewater treatment facility and depend on the amount of dilution available in the wastewater receiving stream. DEP expects that in most cases the Chapter 95 effluent standard of 500 mg/L TDS will suffice to protect instream aquatic life.

The Process

The state's Environmental Quality Board approved the Chapter

[1] PA DEP. 2009. Chapter 95—Wastewater Treatment Requirements, PowerPoint presentation by John H. Hines. www.depweb.state.pa.us/pubpartcenter/lib/pubpartcenter/eqb/2009/081809/chapter95proposedrulemakingtoeqb_da.pdf Accessed 9/3/09.

[2] PA DEP. 2009. Permitting Strategy for High Total Dissolved Solids (TDS) Wastewater Discharges. April 11, 2009. www.depweb.state.pa.us/watersupply/cwp/view.asp?a=1260&Q=545730&watersupplyNav= |30160| Accessed 9/3/09.

How To Obtain a Copy of the Proposed Regulations and Submit Comments

The proposed revised Pennsylvania TDS regulations are available online:

- **The Pennsylvania Bulletin (November 7, 2009) at www.pabulletin.com/secure/data/vol39/39-45/2065.html**
- **Sign up for e-alerts at www.ahs2.dep.state.pa.us/eNOTICEWeb/**
- **Penn State's Nutrient and Water Policy Update: www.nutrientwaterpolicy.aers.psu.edu/**
- **The proposed regulations would amend several sections of Pennsylvania Environmental Regulations. To view the existing regulations on the Web, go to: www.pacode.com/secure/data/025/chapter95/chap95toc.html**

The public comment period is open from November 7, 2009, to February 12, 2010. You may send your comments, suggestions, or objections regarding the proposed regulations by the following methods:

- **Postal mail: Environmental Quality Board, P.O. Box 8477, Harrisburg, PA 17105-8477 (express mail: Environmental Quality Board, Rachel Carson State Office Bldg., 16th Floor, 400 Market St., Harrisburg, PA 17105-2301)**
- **E-mail: Send comments to RegComments@dep.state.pa.us. You must include the subject heading and your name and address.**
- **Public hearings:**

—December 14, 2009, 5 p.m., Cranberry Twp. Municipal Bldg., 2525 Rochester Rd., Cranberry Twp., PA 16066-6499

—December 15, 2009, 5 p.m., Department of Environmental Protection, Cambria District Office, 286 Industrial Park Rd., Ebensburg, PA 15931

—December 16, 2009, 5 p.m., Department of Environmental Protection, Northcentral Regional Office, Goddard Conference Rm., 208 West Third St., Suite 101, Williamsport, PA 17701-6448

—December 17, 2009, 5 p.m., Lehigh County Government Center, 17 S. 7th St., Allentown, PA 18101

If you or a representative wish to testify at one of the above hearings, notify the Environmental Hearing Board at least one week in advance. Details on the procedures to present oral or written testimony are in the Pennsylvania Bulletin at www.pabulletin.com/secure/data/vol39/39-45/2065.html. DEP will make arrangements for people with disabilities in the public hearings.

95 changes in August 2009 as a proposed rule to be published for public comment. They were published in the *Pennsylvania Bulletin* (www.pabulletin.com/) on November 7, 2009 (www.pabulletin.com/secure/data/vol39/39-45/2065.html). The public comment period will end on February 12, 2010. Chapter 93 revisions will follow the same process. Those proposed changes have not yet gone to the board for approval. After each public comment period, DEP will finalize the regulations based on public and legislative comments and submit the final rule to the board. It's possible that only one, both, or neither of the two proposed amendments to Pennsylvania's water quality regulations will become law.

COMMENTING ON THE PROPOSED REGULATIONS: TIPS AND ADVICE

PA DEP is inviting comments on the proposed revisions to the Chapter 95 regulations until February 12, 2010. DEP will consider all input, will develop a comment response document, and is expected to release final regulations in July 2010. **Now is the time** to express your views and shape state policy on water quality and the environment. Whether you comment to oppose or to support one or more of the many proposed changes, remember to:

- **Be specific.** Cite the *Pennsylvania Bulletin* document section and page number or regulation reference to which each comment refers. For example, you might write, "This comment pertains to Section 95.5(c)."
- **Focus on requirements.** It is more effective to comment on proposed changes and existing requirements that DEP is recommending than to make broad comments about the water quality program or resource extraction.
- **Be clear and concise.** Be sure that comments are as clear and straightforward as possible. Use a separate paragraph for each issue discussed.
- **Cite references.** Where possible, focus comments on areas where data can be cited. Be sure to include a full, accurate citation when available.
- **Include your personal experience.** Help DEP understand the practical implications of the proposed changes. Comments based on field experience are relevant and important.
- **Include comments about language.** If the language is confusing for you, it is confusing for others. Be sure to comment on areas where the language is unclear.

In addition to making individual comments, you might want to work through existing organizations and groups to prepare and submit comments. A number of diverse industrial, environmental, and civic organizations may be commenting on the proposed regulations. Examples include industrial trade associations, public water suppliers, local governments, Trout Unlimited, Chesapeake Bay Foundation, Sierra Club, Citizens for Pennsylvania's Future, and the League of Women Voters of Pennsylvania.

DEP's Water Resources Advisory Committee has convened stakeholder subcommittees representing the various major affected industries to study technology and economic impacts of the proposed changes. Check the DEP Web site for the subcommittees' reports.

The proposed rules will change the way total dissolved solids are managed in Pennsylvania waters. They will affect important sectors of the state's industrial economy and will have important implications for water quality in the Commonwealth and for our downstream neighbors. Tell your coworkers, neighbors, and community members about the proposed rules and encourage them to take this opportunity to shape public policy. Consider writing a letter to the editor of your local newspaper, initiating a discussion in an existing local organization, or holding a public issues forum.

EXPECTED TIMELINE FOR POLICY DEVELOPMENT

Chapter 95

August 2009—Draft rules to Environmental Quality Board

September 2009—Review by Attorney General's Office

November 2009—Publication in *PA Bulletin;* public comment period begins (90 days)

December 2009—Public hearings at four regional locations

February 12, 2010—Public comment period ends

Throughout 2010—Additional review and regulatory steps

January 2011—New rules take effect

Chapter 93

Chapter 93 revisions will follow the same process as outlined above. They should be presented to the Environmental Quality Board in November 2009.

FOR MORE INFORMATION

"Wastewater Management for High TDS Wastewater in Pennsylvania" (slide presentation) 4/16/09 by Dana Aunkst, Director, PA DEP Bureau of Water Standards and Facility Regulation. www.depweb.state.pa.us/watersupply/lib/watersupply/high_tds_wastewater/high_tds_permitting.pdf

Penn State College of Agricultural Sciences publications: pubs.cas.psu.edu/

Penn State Cooperative Extension. Natural Gas Impacts. naturalgas.extension.psu.edu/

Penn State Dickinson School of Law, Agricultural Law Resources and Reference Center, Natural Gas Exploration
law.psu.edu/academics/research_centers/agricultural_law_center/resource_areas/natural_gas_exploration

Water Withdrawals for Development of Marcellus Shale Gas in Pennsylvania. 2009. C. Abdalla and J. Drohan. Marcellus Education Fact Sheet 9. Penn State College of Agricultural Sciences.
pubs.cas.psu.edu/PubAuthor.asp?varAuthor=Abdalla&Submit2=Go

Water Resources and Natural Gas Production from the Marcellus Shale. 2009. D. J. Soeder and W. M. Kappel. U.S. Geological Survey Fact Sheet 2009-3032.
pubs.usgs.gov/fs/2009/3032/
Accessed 9/15/09.

REFERENCES

1. Pennsylvania Department of Environmental Protection, (PA DEP). 2009. Chapter 95—Wastewater Treatment Requirements, PowerPoint presentation by John H. Hines.
www.depweb.state.pa.us/pubpartcenter/lib/pubpartcenter/eqb/2009/081809/chapter95proposedrulemakingtoeqb_da.pdf.
Accessed 9/3/09.

2. PA DEP. 2009. Permitting Strategy for High Total Dissolved Solids (TDS) Wastewater Discharges. April 11, 2009.
www.depweb.state.pa.us/watersupply/cwp/view.asp?a=1260&Q=545730&watersupplyNav=|30160|
Accessed 9/3/09.

3. PA DEP 2009. Wastewater Management for High-TDS Wastewaters in Pennsylvania. PowerPoint presentation by Dana Aunkst, 2009.
www.depweb.state.pa.us/watersupply/lib/watersupply/high_tds_wastewater/high_tds_permitting_bw.pdf.
Accessed 9/3/09.

4. United States Environmental Protection Agency (US EPA). National Primary Drinking Water Regulations.
www.epa.gov/safewater/contaminants/index.html
Accessed 9/15/09.

5. West Virginia Department of Environmental Protection, (WV DEP). 2009. TDS—Total Dissolved Solids. PowerPoint presentation by Patrick Campbell, May 18, 2009.

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