

# RULES AND REGULATIONS

## Title 25—ENVIRONMENTAL PROTECTION

### ENVIRONMENTAL QUALITY BOARD

[ 25 PA. CODE CH. 95 ]

#### Wastewater Treatment Requirements

The Environmental Quality Board (Board) amends Chapter 95 (relating to wastewater treatment requirements) to read as set forth in Annex A. The final form rulemaking includes the elimination of a redundant provision and the establishment of new treatment requirements for new and expanding mass loadings of Total Dissolved Solids (TDS).

This final form rulemaking ensures the continued protection of this Commonwealth's water resources from new and expanded sources of TDS. Most importantly, the final-form rulemaking guarantees that waters of this Commonwealth will not exceed a threshold of 500 mg/L. In doing so, the final-form rulemaking assures the continued use and protection of drinking water intakes on streams throughout this Commonwealth, provides the required protection of our aquatic life resources and maintains continued economic viability of the current water users.

This final form rulemaking differs from the proposed rulemaking in several important respects. The differences are direct reflections of concerns raised by industries that would be impacted by this final-form rulemaking. The final-form rulemaking is responsive to those concerns, resulting in improved regulations.

The changes to the final form rulemaking are protective of water resources in this Commonwealth and are appropriately applied by industrial sector, based on the potential impact of the specific sectors to receiving streams in this Commonwealth. While many existing industries throughout this Commonwealth are of concern, the lower TDS concentrations and total loadings of most of those industries does not necessitate treatment below a 2,000 mg/L threshold. A higher standard of 500 mg/L is being applied specifically to the natural gas sector, based on several factors.

The most significant rationale for this industry standard is the fact that wastewaters resulting from the extraction of natural gas are of much higher concentration and represent higher overall loadings when compared to those from other industries. In other words, the effluent standard does not dictate the treatment technology. Instead, selection of the treatment technology is driven by the extraordinarily high raw wastewater TDS concentration. Second, treatment technologies are currently available and are being employed in this Commonwealth and other states for the treatment of these wastewaters, in contrast to other industries. Regulatory certainty provided with this final-form rulemaking will drive investment in and development of new technologies. Third, few other states allow the discharge of these treated wastewaters to their surface waters at all. Those that do allow discharge require the wastewater to be treated to standards very similar to the standards in this final-form rulemaking, dispelling any argument that the Commonwealth is creating an economic disadvantage for this industry. Fourth, this industry is new to this Com-

monwealth and without TDS controls it could impact existing industries, placing them at an economic disadvantage. The potential for growth within this sector is enormous and should that growth be realized, the potential impacts are just as massive. Finally, this industry has shown an ability to respond appropriately in addressing potential impacts to this Commonwealth's natural resources. Options currently exist for other disposal pathways, including nondischarge options and the creativity of the industry only assures that additional disposal and treatment options will flourish and allow for the continued expansion.

While the intent of both the proposed and final-form rulemakings is to address new, larger sources of TDS, the proposed rulemaking focused upon controlling new sources of "high-TDS" wastewater through defining these sources in terms of those that were to be regulated, exempting by default those that were not. To provide greater clarity to the scope of the regulations, the final-form rulemaking takes the approach of specifically exempting certain classes of TDS discharges from the application of this final-form rulemaking. This approach is designed to clearly exclude from the scope of final-form rulemaking all existing loadings of TDS authorized by the Department of Environmental Protection (Department) prior to the effective date of this final-form rulemaking, as well as new and expanding TDS sources which the Department has determined are insignificant from a loading perspective.

In addition, based on stakeholder comments received during an extensive public and stakeholder participation process, the final-form rulemaking adopts a combination of recommended approaches for addressing these larger loadings of TDS. This combination of approaches includes an industrial sector-based regulation along with a watershed-based analysis. The sector-based piece focuses on the oil and gas industry, mandating the treatment of wastewater. Treatment for wastewater that is not recycled shall be performed at a centralized wastewater treatment (CWT) facility to the standards in the proposed rulemaking. This approach sets treatment requirements for natural gas well wastewaters based on available, proven treatment technologies for this industry and takes cost into consideration. These requirements will assure that any threat of water pollution from this rapidly growing industry is prevented in accordance with the mandate of The Clean Streams Law (act) (35 P.S. §§ 691.1—691.1001).

Since there are numerous industrial categories and subcategories that include TDS as a pollutant of concern in their wastewater discharges, the watershed-based approach for industrial sectors other than oil and gas establishes an effluent standard and also provides a variance option for these discharges. Industries other than oil and gas would be subject to this standard, but could be granted a variance when assimilative capacity exists based on a watershed analysis. Further details on the watershed-based approach adopted by the final-form rulemaking follow.

This order was adopted by the Board at its meeting on May 17, 2010.

#### A. *Effective Date*

This final-form rulemaking will go into effect upon publication in the *Pennsylvania Bulletin*.

### B. Contact Persons

For further information, contact Dana K. Aunkst, Director, Bureau of Water Standards and Facility Regulation, P. O. Box 8774, Rachel Carson State Office Building, Harrisburg, PA 17105-8774, (717) 787-8184; or Richard S. Morrison, Assistant Counsel, Bureau of Regulatory Counsel, P. O. Box 8464, Rachel Carson State Office Building, Harrisburg, PA 17105-8464, (717) 787-7060. Persons with a disability may use the Pennsylvania AT&T Relay Service, (800) 654-5988 (TDD users) or (800) 654-5988 (voice users). This final-form rulemaking is available on the Department's web site at <http://www.depweb.state.pa.us>.

### C. Statutory Authority

The final-form rulemaking is adopted under the authority of sections 5 and 402 of the act (35 P. S. §§ 691.5 and 691.402), which provide for the adoption of regulations implementing the purposes and requirements of the act and for the regulation of activities which create a danger of pollution to the waters of this Commonwealth, and section 1920-A of The Administrative Code of 1929 (71 P. S. § 510-20), which authorizes the Board to promulgate rules and regulations necessary to implement the act.

### D. Background of the Amendments

#### Need for the Final-Form Rulemaking

Many rivers and streams in this Commonwealth have remaining assimilative capacity for TDS when compared to a 500 mg/L TDS in-stream limit, but that capacity is limited. To characterize the relationship between in-stream TDS concentrations and stream flows and to predict the effect of additional TDS loadings on water quality in these waterways, regression analyses of stream flow and TDS were performed. Generally, TDS concentrations exhibit an inverse logarithmic or power relationship

with stream flow, with higher TDS concentrations observed at lower flows and lower TDS concentrations observed at higher flows. The TDS-flow regression equations were used to estimate the in-stream TDS concentration at the low-flow condition known as the  $Q_{7-10}$  flow, which is defined as the flow below which the annual 7-day minimum flow falls in 1 out of 10 years on the long-term average. The  $Q_{7-10}$  was designed to match the dose-response toxicity profile of most pollutants with the flow profile of natural free-flowing surface waters.

More specifically, the TDS-flow regressions performed by the Department were based on mean daily stream flow as recorded at United States Geological Survey (USGS) flow gauging stations and TDS samples collected at long-term monitoring stations near those flow gages. A regression equation was generated from the TDS-flow scatterplots, usually a logarithmic or power function best fit the observed TDS-flow relationships. The TDS concentration at  $Q_{7-10}$  streamflow was then estimated using the regression equation.

For example, at Water Quality Network (WQN) Station 905 (Beaver River at Beaver Falls, PA) the existing in-stream concentration at the  $Q_{7-10}$  river flow of 530 cubic feet per second is 448 mg/L, based on 10 years of data. This means that about 90% of the assimilative capacity already has been consumed and only about 10% (52 mg/L or 150,000 lb/day) of assimilative capacity remains for the entire Beaver River watershed between the existing concentration and the water quality criterion of 500 mg/L. This type of water quality analysis shows that available assimilative capacity for TDS is limited in some watersheds, especially considering that the Department should reserve assimilative capacity for future uses and also maintain a margin of safety. The following table summarizes the results of these analyses at a number of sites.

*Results of TDS Assimilative Capacity Analyses*

WQN Station #	Stream Name	Location	$Q_{7-10}$ flow estimate (ft <sup>3</sup> /sec)	Period of record for regression	n	TDS concentration estimate (mg/L) at $Q_{7-10}$ flow
301	Susquehanna River	Danville	1,130	1998-2007	95	255
302	Susquehanna River	Retreat	1,003	1998-2008	97	271
305	Susquehanna River	Towanda	585	1998-2008	104	211
306	Susquehanna River	Conklin, NY	178	1998-2008	55	162
323	Susquehanna River	Wilkes-Barre	748	1998-2008	57	242
401	West Branch Susquehanna River	Lewisburg	764	1998-2007	94	259
402	West Branch Susquehanna River	Williamsport	575	1998-2007	51	302
404	West Branch Susquehanna River	Karthaus	222	2004-2007	52	542
406	West Branch Susquehanna River	Bower	43	1998-2008	60	533
422	Clearfield Creek	Dimeling	42	1998-2008	60	769
448	West Branch Susquehanna River	Jersey Shore	463	2004-2008	68	319
701	Monongahela River	Braddock	905	1998-2004	33	360
702	Monongahela River	Elizabeth	651	1998-2008	60	403
714	Dunkard Creek	Shannopin	3	1998-2008	61	2,667
725	Monongahela River	Point Marion	353	1998-2008	58	346
822	Clarion River	Cooksburg	105	1998-2009	58	255
867	Allegheny River	Franklin	1,770	1998-2008	54	159

WQN Station #	Stream Name	Location	Q <sub>7-10</sub> flow estimate (ft <sup>3</sup> /sec)	Period of record for regression	n	TDS concentration estimate (mg/L) at Q <sub>7-10</sub> flow
903	Raccoon Creek	Moffatts Mill	8	1998-2010	68	1,396
905	Beaver River	Beaver Falls	530	1985-2009	58	448

In contrast to these analyses, representations of TDS assimilative capacity in surface waters that use a simple plot of TDS versus time tell very little until it is too late, when water quality violations are routine and good options do not remain. The Department is required to prevent violations of water quality standards by planning ahead and by using available data and good science. When data are lacking, a conservative approach is warranted. It is incumbent upon the Department, as well as any new proposed sources of loading, to first demonstrate that sufficient assimilative capacity is available before approving additional sources. The Department has broad experience managing the resource and is familiar with the minimum requirements that must be achieved.

The Department has already been constrained by the situation. For example, in the West Branch Susquehanna River basin, eight applications for new treated discharges were submitted for new discharges of high-TDS wastewater, totaling about 2.6 million gallons of flow, or about 3.3 million lb/day of TDS loading. But there is not assimilative capacity available above Karthaus, so discharges may not be approved above Karthaus. Less than 1 million lb/day of assimilative capacity is available between Karthaus and Lewisburg, as compared to the approximately 3.3 million lb/day in requested capacity. Further, the Department will reserve capacity for future use and also provide a margin of safety for pollutants that may be influenced by nonpoint sources; consequently, much less capacity is actually available for allocation. It is unknown how many of these new facilities will be built, but it is clear that there is a large discrepancy between the amount of proposed TDS loading and the amount of TDS loading the resource can safely accommodate. This is true even considering the reduced projections of the volume of wastewater and TDS load that may result from development of the Marcellus Shale formation in this Commonwealth.

**TDS**

TDS are comprised of inorganic salts, organic matter and other dissolved materials in water. They can be naturally present in water or the result of runoff, mining practices, oil and gas practices or industrial or municipal uses and treatment of water. TDS discharges contain minerals and organic molecules that can provide benefits such as nutrients, when moderately present, but also may contain contaminants such as toxic metals and organic pollutants. The moderate nutrient benefits are not likely in the case of a high TDS discharge. It is the inorganic TDS that are of concern. The concentration and composition of TDS in natural waters is determined by the geology of the drainage, atmospheric precipitation and the water balance (evaporation/precipitation).

TDS causes toxicity to water bodies through increases in salinity, changes in the ionic composition of the water and toxicity of individual ions. The composition of specific ions determines the toxicity of elevated TDS in natural waters. Also, as the hardness increases, TDS toxicity may

decrease.<sup>1</sup> The major concern associated with high TDS concentrations relates mostly to direct effects of increased salinity on the health of aquatic organisms.

Water quality analyses previously referenced indicate that the major watersheds of this Commonwealth have a very limited ability to assimilate increased loads of TDS, sulfates and chlorides. This phenomenon was most evident during the fall of 2008 when actual water quality issues regarding these parameters emerged in the Monongahela River basin. While river flows reached seasonal lows, the concentrations of TDS and sulfates in the river increased to historic highs, exceeding the water quality standards at all of the 13 potable water supply (PWS) intakes from the border with West Virginia to Pittsburgh. Water quality standards for TDS and sulfate were consistently exceeded in the river through November and December of 2008. Elevated chloride levels were observed on at least one major tributary, South Fork Tenmile Creek, and for the first time, elevated bromide levels were observed in these streams.

During this period, several environmental agencies performed studies on the effects of TDS, sulfate and chloride discharges on the Monongahela and some of its tributaries. A study<sup>2</sup> conducted by the United States Environmental Protection Agency (EPA), the Department and the Allegheny County Health Department also identified bromides as a key parameter of concern in these waters. The study concluded that a high percentage of the disinfection by-products (DBP) being formed in the drinking water systems were brominated DBPs, which pose a greater health risk than chlorinated DBPs; subsequent formation of brominated DBPs increases overall DBP concentrations, specifically trihalomethanes (THM). The study also concluded that based on the speciation there appears to be a strong correlation between THM formation and elevated source water bromide concentrations in the Monongahela River. As a result, the 17 PWS intakes on the Monongahela River are subject to higher levels of the more toxic brominated DBPs, which result in increased risks of bladder cancer to their consumers.

Several studies<sup>3,4</sup> on the potential impacts to aquatic life from these large TDS discharges were also conducted on major tributaries flowing into the Monongahela River in Greene County. Each of these studies documents the adverse effects of discharges of TDS, sulfates and chlorides on the aquatic communities in these receiving streams. The former concludes that there is a high abundance of halophilic (salt-loving) organisms downstream from the discharges of TDS and chlorides and a clear transition of fresh water organisms to brackish water organisms in the receiving stream from points

<sup>1</sup> Soucek, D.J. & A.J. Kennedy. 2004. Effects of Hardness, Chloride and Acclimation on the Acute Toxicity of Sulfate to Freshwater Invertebrates.

<sup>2</sup> Handke, Paul. 2009. Trihalomethane Speciation And The Relationship To Elevated Total Dissolved Solid Concentrations Affecting Drinking Water Quality At Systems Utilizing The Monongahela River As A Primary Source During The Third And Fourth Quarters Of 2008, PA-DEP.

<sup>3</sup> Spear, Rick and Kenderes, Gary. February 2009. Cause and Effect Survey, South Fork Tenmile Creek, PA-DEP.

<sup>4</sup> Milavec, Pamela J. November 2008. Aquatic Survey of Lower Dunkard Creek, PA-DEP.

above the discharge to points below. It is evident from this study that increases in salinity have caused a shift in biotic communities.

The Monongahela River watershed is being adversely impacted by TDS discharges and many points in the watershed are already impaired, with discharges of TDS, sulfates and chlorides as the leading cause of impairment.

Although the Monongahela has received the most attention, it is not an anomalous situation. The Department studied the results of stream monitoring and conducted an analysis on the water quality of the Beaver River in western Pennsylvania. These results show upward trends in TDS concentrations. The Department also conducted similar studies on the Shenango and Neshannock Rivers, with similar upward trends in TDS concentrations. Watershed analyses conducted by the Department of the West Branch of the Susquehanna River and the Moshannon Creek watersheds also indicate that these watersheds are limited in the capacity to assimilate new loads of TDS and sulfates.

The Department received several permit applications for wastewater discharge in these areas with limited assimilative capacity. These permits, if issued, will necessarily have to impose conservative limitations on TDS loadings from the discharge due to the existing high in-stream concentrations of TDS. The Department is constrained from approving any significant portion of pending applications for new discharges of high-TDS wastewater that include sulfates and chlorides because of the threat posed by these proposed discharges to the quality of streams in this Commonwealth.

Existing practices for controlling pollutants in high TDS-containing wastewaters concentrate on the removal of heavy metals, but the processes employed generally do not actually treat for TDS, sulfates and chlorides by removing those pollutants from the wastewater. Instead, control of the effects from high amounts of TDS, chlorides and sulfates currently rely on dilution of the wastewater by the flow of the receiving stream. Dilution is not treatment. As documented by the rising levels of TDS in the waters of this Commonwealth, dilution in and of itself can no longer be considered an adequate practice to control consistently the effects of wastewaters containing substantial loadings of TDS and its components such as sulfates and chlorides. Treatment technologies such as reverse osmosis and evaporation/crystallization will have to be employed to prevent new or expanded loadings of TDS from consuming all of the remaining assimilative capacity in waterways in this Commonwealth. In addition, as the Department moves forward with watershed restoration efforts, such as treatment of abandoned mine drainage discharges and implementation of Total Maximum Daily Loads (TMDL), treatment of TDS, sulfates and chlorides will be necessary to assure that watershed restoration is accomplished and that the existing and designated uses of our streams are maintained and protected.

*Public Response and Public Involvement in Development of the Final-Form Rulemaking*

The proposed rulemaking was published at 39 Pa.B. 6467 (November 7, 2009). Due to a publishing error that listed an incorrect e-mail address for the Board, a correction to the proposed rulemaking was published at 39 Pa.B. 6547 (November 14, 2009). The Board advertised that the comment period for the proposed rulemaking was extended by 7 days. The public comment period officially closed on February 12, 2010. In addition, four public

hearings were held as follows: December 14, 2009, in Cranberry Township, Butler County; December 15, 2009, in Ebensburg, Cambria County; December 16, 2009, in Williamsport, Lycoming County; and December 18, 2009, in Allentown, Lehigh County.

The Board received extensive public comments regarding the proposed effluent standards for high-TDS wastewaters. A summary of the comments and responses to the proposed rulemaking appears in Section F.

*Water Resources Advisory Committee Stakeholder Process*

Prior to recommending that the proposed rulemaking be provided to the Board, the Water Resources Advisory Committee (WRAC) suggested that further examination be made during the comment period to address two critical areas. WRAC suggested that the Department examine the costs of the proposed rulemaking on the sectors that would be impacted, and the technologies available to treat discharges high in TDS. WRAC created the TDS Stakeholders Subcommittee to work in cooperation with the Department on these issues.

The TDS Stakeholders Subcommittee was tasked with examining the issue of cost and technology and to make recommendations to WRAC for submission to the Department in the form of formal comments on the proposed rulemaking. The TDS Stakeholders Subcommittee was made up of members of the various industries impacted as well as members of interested environmental groups. The TDS Stakeholders Subcommittee met monthly from August 2009 through March 2010; members of the Department involved in the development of the proposed rulemaking attended these meetings. During that time frame, various sector groups, as determined by TDS Stakeholders Subcommittee members, presented their findings on the impact of the proposed rulemaking on their industry or sector. Those sector groups were as follows: Drinking Water, Natural Resources, Utilities, Municipals, Industrial, Mining and Oil and Gas. All sector groups were provided with an opportunity to present their findings to the TDS Stakeholders Subcommittee and those presentations are available on the Department's web site at [http://www.portal.state.pa.us/portal/server.pt/community/water\\_resources\\_advisory\\_committee\\_%28wrac%29/14017/wrac\\_taskforce\\_on\\_chapter\\_95/631764](http://www.portal.state.pa.us/portal/server.pt/community/water_resources_advisory_committee_%28wrac%29/14017/wrac_taskforce_on_chapter_95/631764).

Following the various sector presentations, the TDS Stakeholders Subcommittee debated recommendations for alternative approaches to the draft regulations as proposed by the Department. The Department staff were involved in all of these discussions. The TDS Stakeholders Subcommittee provided a summary of the proceedings to WRAC on March 17, 2010. Those comments are available at <http://files.dep.state.pa.us/PublicParticipation/Advisory%20Committees/AdvCommPortalFiles/WRAC/WRAC-%20TDS%20Task%20Force%20Final%20Report%203-12-10.pdf>.

In summary, the TDS Stakeholders Subcommittee suggested a watershed based approach that would allow for use of assimilative capacity when it was available. Further, the TDS Stakeholders Subcommittee suggested that the Department monitor the TDS loadings in watersheds Statewide and only enact effluent limits on dischargers when the loading within the water body was nearing the limit of assimilative capacity. The TDS Stakeholders Subcommittee also suggested that the oil and gas sector be incentivized or perhaps even required to recycle or reuse some percentage of fluids captured in the initial stages of well development, the flow back water as it is

traditionally called. Finally, the TDS Stakeholders Subcommittee suggested that what wastewater could not be reused for fracturing other gas wells should be transported to treatment facilities that provide treatment to appropriate standards.

The Department endorsed the process in which these recommendations were developed and has fully considered the recommendations provided by this group. The TDS Stakeholders Subcommittee was a broad reflection of impacted stakeholders and provided invaluable input, much of which the Department applied as it moved forward in revising the proposed rulemaking.

The Department also met individually, on multiple occasions, with representatives of the Pennsylvania Coal Association (PCA), the Marcellus Shale Coalition (MSC), the Pennsylvania Chamber of Business and Industry (Chamber), Waste Management, the Electric Power Generation Association and the Allegheny Conference. The amendments being made in this final-form rulemaking directly respond to most of the recommendations made by the TDS Stakeholders Subcommittee and these other organizations. See the Summary of Changes to the Proposed Rulemaking in Section E of this preamble.

In addition, prior to presenting this regulatory package as final to the Board, the Department met with WRAC on April 14, 2010, seeking concurrence in moving forward with the revised final-form rulemaking. During this discussion, WRAC members sought further clarification on the watershed approach, the impact on conventional gas drillers and the mandatory recycling provision in the proposed rulemaking. Clarification was provided by the Department, summarizing the intent of the watershed based approach. This included an explanation of what was deemed an existing discharge and further clarification that only the additional load above baseline would be subject to the final-form rulemaking should the total loading be more than the 5,000 pounds in mass loading, the Department has determined to be de minimis.

Discussion on the impacts to the oil and gas industry, particularly the conventional well drillers, was also significant. The Department clarified its intent that existing CWT facilities, in particular those that treat conventional drilling wastewater, are considered as existing facilities and can continue to accept oil and gas wastewater at levels currently approved. Finally, discussion focused on a provision within the regulation that may require the recycling or reuse of oil and gas wastewater. WRAC members noted that this will negatively impact both conventional and Marcellus drillers and should be revised or removed from the final-form rulemaking. Specifically, the effective date of the final-form rulemaking and the subsequent impact that would have on the industry should the recycling provision remain was noted.

The Department agreed to continue working to address the concerns of WRAC members and the stakeholders they represent, including further examination of the effective date. With the expected continued efforts of the Department noted, WRAC concurred unanimously to move the revised regulation forward to the Board. The motion that carried was:

WRAC appreciates all of the Department's efforts to respond to our comments and improve the regulation. WRAC believes that the current draft of the regulation is substantially improved over the draft we reviewed in July of 2009, and we understand that additional improvements will be made based on our comments today. Although some of the individual WRAC members continue to have

significant concerns about the regulation and whether it should proceed without an advance notice of final rulemaking, in light of the progress and efforts made to date and in light of the Department's wish to proceed with the regulation, the consensus of the Committee is that the regulation should proceed for final consideration by the Board.

#### *Sector-Based Approach for the Oil and Gas Industry*

The Department reviewed the comments received and determined that a sector-by-sector approach to controlling TDS is appropriate. High-TDS wastewaters from different industries present different treatment challenges. Not all industrial wastewaters containing TDS are consistent. Based on the need for regulation of a rapidly expanding industry which generates wastewaters with extraordinarily high levels of TDS and chlorides, the readily available proven treatment technologies for this wastewater, the costs associated with treatment, and the overwhelming public comment in favor of a standard for this industry, the proposed rulemaking refined its original focus on treatment for oil and gas wastewaters. The final-form rulemaking now contains more specific treatment requirements for wastewater generated from all natural gas drilling activities.

This approach is consistent with the Federal regulatory approach that separates technology-based, end-of-pipe requirements by industry sectors. These requirements establish effluent limits based on best available technologies within an industry, and thus encourage the development and spread of these technologies. This approach further accounts for economic impacts by distinguishing between new and existing sources of pollution, recognizing that new sources can plan their operations factoring in the regulatory requirements for wastewater treatment. The Marcellus shale play has resulted in thousands, and will result in tens of thousands, of new sources of natural gas drilling wastewaters. Although the industry has shown some recent success with reduction in volumes of wastewater needing treatment through the recycling and reuse of flowback and production waters, it is clear that the future wastewater return flows and treatment needs will be substantial. It is appropriate to have a regulatory framework in place now that protects the streams in this Commonwealth under any future scenario. It is not appropriate to simply "wait and see." The Department believes that this approach will promote the reuse of flow back and production waters thus minimizing the costs of treatment. This approach will also drive methods of treatment and disposal that do not involve stream discharge, thus providing the protection for a valuable resource.

As stated throughout this preamble, as noted by the TDS Stakeholders Subcommittee, as identified in the Department's Strategy for Addressing High-TDS Wastewater and as recognized by an overwhelming majority of public comments on this final-form rulemaking, the primary threat to the quality of streams in this Commonwealth from TDS is coming from the development of the Marcellus shale play. This play, estimated to contain as much as a 500 trillion cubic feet of recoverable natural gas, could result in the development of up to 50,000 new, producing gas wells over the next 20 years.

The Department is encouraged that the industry has developed and is implementing recycling and reuse and that the play is drier than anticipated, together reducing flow back volumes significantly from the original estimates that created the initial urgency for the proposed rulemaking. The Department remains concerned, how-

ever, that development of the play is still in its infancy and as the play matures these phenomena may change significantly. Evidence from the Barnett shale experience supports this concern. As the play matured, flow back rates increased.

Second, the current Marcellus experience does not provide enough information on the long term rates of produced water to be expected to return from the formation. These wells are anticipated to produce very highly concentrated TDS wastes (over 300,000 mg/L<sup>5</sup>) continuously over the course of 20 to 30 years. For example, if these wells produce an average of ten barrels per week of produced water over their useful lives, a single average well could produce about 27 tons of salt per year (at 300,000 mg/L). Multiply this amount by tens of thousands of Marcellus gas wells, and the potential pollutional effects from these loadings are tremendous. Finally, not enough is known at this point about whether Marcellus wells may need to be "re-fracked" one or more times in the future, thus providing additional uncertainty regarding treatment and disposal needs for the wastewater.

The Department is responsible for assuring that future generations in this Commonwealth have the right to clean air, pure water and to the preservation of the natural, scenic, historic and esthetic values of the environment. This responsibility, along with all of the uncertainty related to the development of the Marcellus play and the potential wastewater generation, leads the Department to take a conservative, proactive approach to regulating the treated wastewater discharges from this new production.

#### *Available Technologies*

Wastewater originating in this formation presents treatment challenges due to the presence of high concentrations of chlorides, barium and strontium, and the presence of naturally-occurring radioactive radium. It is clear that technology for treating the extraordinarily high TDS wastewater from natural gas well drilling operations is both proven and widely available. The Department met with over 60 manufacturers and vendors of technologies for treating the very high levels of TDS from the oil and gas industry, specifically the Marcellus shale formation. While some of these vendors do not have actual facilities in operation and are seeking to get into the business, at least six manufacturers have either piloted the technology at full scale or have facilities currently operating in other states.

Much of the hesitancy on the part of these technology vendors is the result of uncertainty in the current regulatory framework. Companies are reluctant to move forward without a clear direction concerning required treatment levels for TDS. Implementing this final-form rulemaking will provide regulatory certainty for companies proposing treatment facilities for high TDS wastewaters.

Notably, treatment facilities for wastewater from natural gas well operations will have a positive economic impact. Investment companies have indicated that without clear direction they are less willing to provide capital for financing these types of wastewater treatment facilities. One company provided information that their treatment plant, if built and operated, could create approximately 70 to 100 short-term jobs during construction and about 12 permanent jobs during operation of their facility.

Some companies have also indicated that they may be able to produce a salable salt product after treatment of the high TDS water.

The Department issued two National Pollutant Discharge Elimination System (NPDES) permits for facilities to treat these wastewaters to the standards in the proposed rulemaking, one in the Williamsport area—Terraqua Resource Management<sup>6</sup>—and one in Somerset County—Somerset Regional Water Resources.<sup>7</sup> The Department has at least 29 other permit applications currently under review. In addition, facilities have been constructed and are in operation in other states. AOP Clearwater<sup>8</sup> recently began operation of a zero liquid discharge facility in Fairmont, West Virginia, and 212 Resources<sup>9</sup> operates a treatment facility in Colorado. Integrated Water Technologies<sup>10</sup> has recently completed full-scale pilot studies documenting that their technologies are successful in treating these wastewaters to the proposed standards or better.

The common thread with these facilities is that all employ a form of evaporation/distillation. Flow back waters from natural gas well drilling activities can generally be recycled until they reach certain very high concentrations of TDS, at which point the wastewater must be disposed because it can no longer be effectively reused. Wastewaters that are extremely high in TDS concentration, that is, greater than 30,000 mg/L, are generally not amenable to other technologies. Therefore, the very high concentrations of TDS in this industry's wastewater will necessitate treatment by evaporation/distillation technology. For example, reverse osmosis cannot economically treat the extraordinarily high levels of TDS because the membranes foul and need to be changed too often. It is also important to understand that use of evaporation/distillation technology always results in treated water with TDS concentration levels significantly lower than the 500 mg/L standard for CWT effluent in the final-form rulemaking (it can be as low as 10 mg/L). It is the extraordinarily high TDS quality of the raw wastewater that drives the treatment technology; therefore, the specific effluent standards for the natural gas industry in the proposed rule have been retained in the final-form rulemaking.

#### *Costs of Treatment*

The natural gas well drilling industry in this Commonwealth has a long and notable history. Hydraulic fracturing is not new to this Commonwealth, either. According to the Pennsylvania Oil and Gas Association (POGAM), almost every oil and gas well in this Commonwealth since the early 1960s has been hydraulically fractured in some way to enhance recovery. Handling and disposing of fracturing fluids (produced water) is an old practice. Prior to the Marcellus shale activity in this Commonwealth, oil and gas production (and its concomitant generation of produced waters) was gradually diminishing. The old practice common to this industry of addressing TDS through dilution thus posed a retreating threat to the water quality of streams in this Commonwealth. The arrival of the Marcellus play has drastically changed that paradigm.

<sup>6</sup> Terraqua Resource Management, LLC, 1000 Commerce Park Drive, Williamsport, PA 17703. NPDES Permit No. PA0233650.

<sup>7</sup> Somerset Regional Water Resources, Larry Mostoller, 888 Stoystown Road, Somerset, PA 15501. NPDES Permit No. PA0253987.

<sup>8</sup> AOP Clearwater, Rob Bealko, Operations Manager, 168 AFR Drive, Fairmont, WV 26554.

<sup>9</sup> 212 Resources. Robert Waits, Executive VP, Business and Government Affairs, 2825 E. Cottonwood Parkway, Suite 180, Salt Lake City, UT 84121.

<sup>10</sup> Wastewater Demonstration Final Report. Integrated Water Technologies. 150 Clove Road, Little Falls, NJ 07424. Mavickar Environmental Consultants. January 2010.

<sup>5</sup> STW Resources, Inc. August 26, 2008. Presentation to PA-DEP.

In the preamble to the proposed rulemaking, the Board referred to estimated costs for treating this wastewater at approximately 25¢ per gallon. Each of the manufacturers previously cited that has technology operating has verified that the true costs for treatment of this wastewater range between 12¢ and 25¢ per gallon.

The MSC provided the TDS Stakeholders Subcommittee with revised estimates of the anticipated treatment and disposal capacity need through a presentation at the November 10, 2009, subcommittee meeting. Their estimate of 2 million gallons per day is based on current flow back rates. The Department believes that this estimate may be low at this point in time, because of the infancy of Marcellus well development in this Commonwealth (see previous discussion). If the estimate were to be doubled, the annual cost of treatment for the industry Statewide could be as high as \$365 million (4 million gal/day \* 25¢/gal).

The cost of wastewater treatment, when compared with estimates of the annual revenue from Marcellus Shale gas extraction, is minuscule. Using industry projections, if there are indeed 500 trillion cubic feet of gas recoverable over the next 50 years, and if the price per 1,000 cubic feet were to hold at today's levels (about \$5, which is an extremely conservative assumption), the annual revenue industry-wide could be \$50 billion. Based on the treatment needs estimates by the industry and this analysis, the cost of treatment would be 0.4% to 0.8% of annual revenue, an insignificant percentage. Moreover, this industry has shown an ability to quickly adjust and develop cost effective solutions, as evidenced by the development and embrace of techniques for reuse of fracturing fluids. Treatment to levels in the final-form rulemaking clearly can be achieved at a reasonable cost to the natural gas industry in this Commonwealth. On the other side, the benefits from preventing the rise of TDS and chloride pollution levels in this Commonwealth's water resources are significant. For example, in economic terms, the TDS Stakeholders Subcommittee noted that stream-related tourism and recreation in this Commonwealth brings in an estimated \$28 million annually.

The Marcellus Shale play is in its infancy, but the industry is clearly growing and will continue to grow for at least the next 10 years throughout the Marcellus Shale formation in this Commonwealth. The Department's aim is to ensure that future growth of this industry is considered in the rules and regulations it puts in place.

Other industries potentially impacted by this final-form rulemaking are not in a growth stage, nor on a scale as large. Part of the Department's mission is to consider the cost effectiveness of regulations, their impact on the regulated community and whether the regulated community can continue to operate should rules be enacted. This evaluation has led the Department to recognize that other industries throughout this Commonwealth could not effectively adapt to broad-based required end-of-pipe load reductions in TDS; therefore, the watershed based approach was selected for these other industries.

The Board received comments on the proposed rulemaking from over 4,220 commentators. It is important to recognize that over 90% of those comments supported the proposed rulemaking and that the overwhelming majority of the supporting comments either assumed the proposed effluent standards were for the oil and gas industry or supported the effluent standards applying only to the oil and gas industry. The Department cannot simply discount this tremendous degree of public direction.

Effective and responsible management of the very real environmental challenges involved with the natural gas industry in this Commonwealth are needed to move forward with its development. The Department must address these challenges now to provide the public and the industry with the regulatory framework to assure that the Marcellus Shale formation in this Commonwealth can be developed safely and rapidly, while protecting and preserving our other natural resources. The wealth and promise of the resource is indisputable, and appropriate environmental management will promote the development of the formation, not hinder it. The amendments to Chapter 95 in this final-form rulemaking are essential to providing needed regulatory certainty.

#### *Watershed-Based Approach for Industries Other than Oil and Gas*

The Board agrees with the comments that were received by various industries pointing out that the proposed rulemaking is a one-size-fits-all approach that may not be appropriate. Different industries have very different wastewaters, even in the composition of the TDS. There are many different technologies that would be necessary to treat these different wastewaters and the costs of treatment to a given standard could create an inequitable economic problem. For example, achieving a 500 mg/L standard for two different industries could require two different technologies, based on the type of TDS, with one technology being much more expensive than the other.

At the same time, allowing TDS discharges from all of these industrial sectors based only upon dilution, that is, controlling TDS based on water quality-based effluent limitations alone (as recommended by the Chamber), also creates an unlevel playing field. Effluent limitations would then be based on location only, and could give some competing businesses an advantage for simply being located in a watershed without a PWS intake.

Inorganic TDS is known as a conservative parameter, meaning that TDS is not subject to fate during transport in the water column. These solids are dissolved and will stay dissolved barring huge changes in stream pH. This means that a pound of TDS discharged in the headwaters of a watershed is still a pound of TDS at the mouth of the watershed, or of more concern, at the location of the PWS intake. Cumulative loadings of TDS from multiple discharges upstream of these intakes can cause violations of water quality criteria at design conditions and result in the need for an allocation strategy. Allocation strategies are inequitable unless the same requirements apply to all contributing discharges, independent of the location of each discharge in the watershed.

The Board addressed this issue and the comments received from the various potentially-affected industries in this final-form rulemaking. The approach establishes an effluent standard for sectors (other than natural gas well operations) at 2,000 mg/L, and allows a variance from this standard under certain conditions specific to the watershed in which the discharge is located. The 2,000 mg/L as a monthly average standard was selected for several reasons. First, it is the bar set in the proposed rulemaking for a high-TDS discharge, meaning that TDS-containing discharges from most industrial sectors and publicly owned treatment works (POTW) do not contain more than 2,000 mg/L TDS and thus would not be subject to this final-form rulemaking. Moreover, unless the discharge flow volume is quite low, a discharge containing greater than 2,000 mg/L will have a TDS loading rate that significantly impacts the assimilative

capacity of the receiving stream, even if that stream has substantial flow volume. Second, the final-form rule-making applies only to new and expanding loads of TDS, not the existing loads, making it more easily achieved and enabling industries that will be affected to plan their operations to meet the new standard. Finally, while the end-of-pipe 2,000 mg/L standard is less stringent than the instream water quality criterion, it is within four to five times that value, and in the Department's Best Professional Judgment assures that adequate instream dilution will be available to prevent exceeding the water quality standard.

Variances to this standard can be approved by the Department provided that the applicant can demonstrate the need for a variance. A demonstration must be based on the character of the wastewater, the availability of treatment technologies and the costs associated with meeting the standard. These variances are not without limitations. The Department will develop guidance materials to assist applicants in the completion of requests for variances prior to the effective date of this final-form rulemaking.

Under the final-form rulemaking, an upper bound that limits the degree a discharge can vary from the standard will be established based on water quality considerations. In addition, the watershed analysis must assure that the cumulative load from all sources at the next downstream PWS intake does not exceed 75% of the water quality-based assimilative capacity at design stream flow conditions, as required in § 96.3 (relating to water quality protection requirements), that is,  $Q_{7-10}$ .

The Department will closely monitor TDS levels and take steps necessary to limit increased or future discharges and prevent water quality criteria violations. When the remaining assimilative capacity of a receiving stream falls below 25%, based on analysis at design stream flow conditions, the Department will develop a wasteload allocation for all discharges of TDS that contribute to the specific water quality standards compliance point.

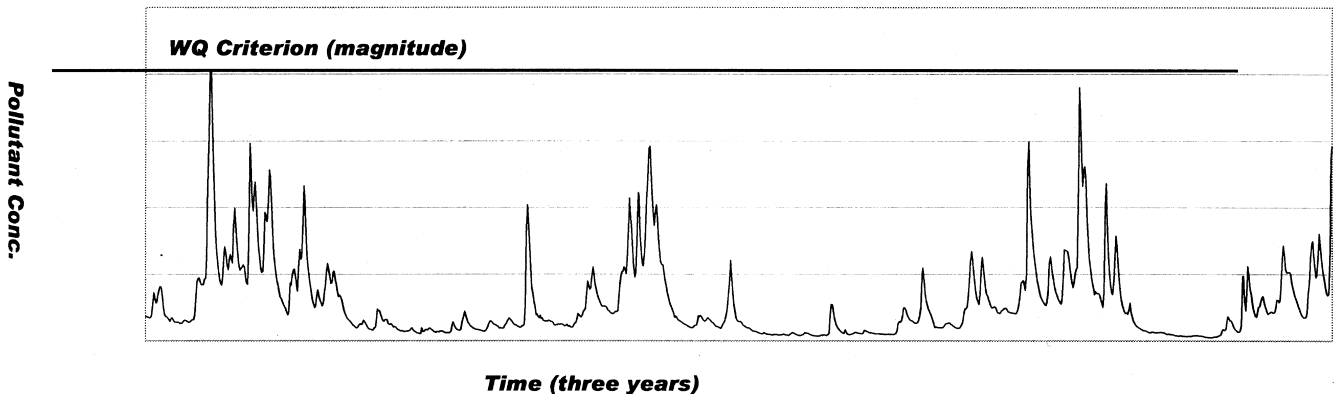
*Real-Time Management or Flow Management*

Throughout the comment period, the Board received recommendations that a real-time, or flow management,

approach to controlling TDS should be implemented by the Department in place of imposing treatment requirements. Specifically, the recommendation was that the Department should set aside the Chapter 96 (relating to water quality standards implementation) requirement that allocations be based on the  $Q_{7-10}$  design low-flow condition in the receiving water. Support for this position relies on a rationale that does not reflect real-world considerations or good science. This method of managing flows on a real-time basis presents many problems, most notably compliance with Federal and State regulatory water quality standards.

*Water quality standards.* The fundamental characteristic of numeric water quality criteria is that they include three components: magnitude, frequency and duration. This is especially true of water quality criteria designed to protect aquatic life. Each criterion has been substantiated and advanced based on underlying limitations and conditions that have been specified in the criteria development documentation. Implementation of these criteria is invalid unless the underlying limitations and conditions are preserved. If there is a 230 mg/L water quality criterion for chloride designed to protect aquatic life, the criterion magnitude is advanced on the basis that exposure to concentrations that high will occur rarely (in this case, a frequency of no more than once every 3 years) and for limited periods of time (a duration of no more than 4 days). For the rest of the time, the underlying requirement is that the target organism is not stressed by exposure to chloride at any significant level, that is, that exposure to elevated concentrations of chloride is a rare and isolated event. To achieve the underlying frequency and duration components of the water quality criterion, Water Quality Based Effluent Limitations (WQBEL) must be developed that limit the frequency and duration of instream concentrations of the pollutant of concern.

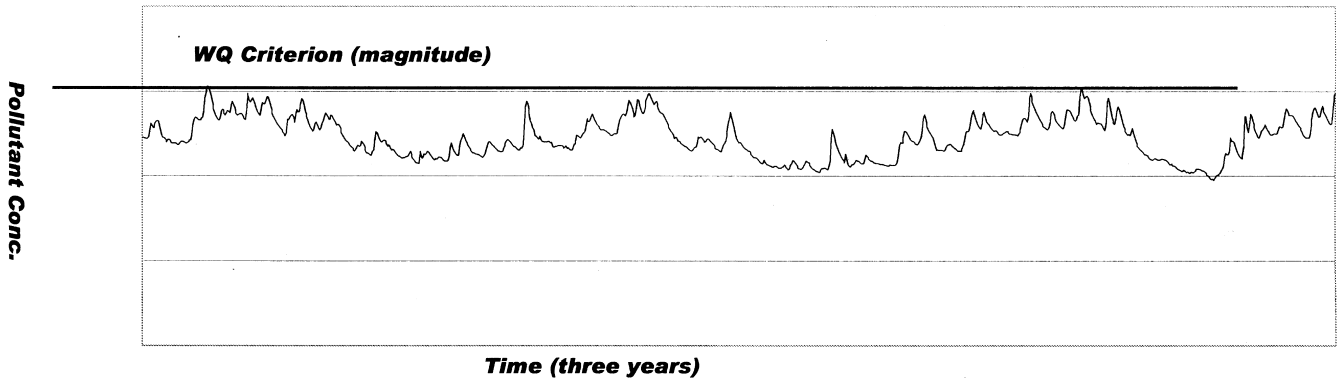
An example of a target distribution that would achieve the magnitude, frequency, and duration components of the water quality criteria looks something like the following chart. The criterion magnitude is challenged only rarely with near-background concentrations existing most of the time.



The effect of using real-time flow management is to allow instream concentrations to approach the criterion magnitude value more often and for longer periods of time. An example of real-time flow management, a target distribution that would achieve the magnitude component but not achieve the frequency and duration components of the water quality criterion might look more like the following chart. The criterion magnitude is challenged continually and concentrations



essentially never drop to near-background levels. The WQBEL has not been designed to achieve the frequency and duration components of the water quality criterion, even if the criterion magnitude has not been exceeded.



The  $Q_{7-10}$  design flow condition was not arbitrarily selected. It was designed to match the flow profile of natural free-flowing surface waters with the dose-response toxicity profile of the pollutant, and thereby achieve the underlying frequency and duration components of the water quality criteria. Use of the steady-state  $Q_{7-10}$  design flow condition is the standard in NPDES permitting at both the State and Federal level for most pollutants. Real-time flow management is inconsistent with the underlying frequency and duration components of the water quality criteria and violates the criterion as surely as if the instream concentration exceeds the criterion magnitude. Failure to achieve the frequency and duration components of the water quality criteria has real-world consequences in terms of biological and other impacts.

*Reliance on the dose-response relationship.* There are limitations inherent in the methods employed to produce water quality criteria. The normal objective is to define the dose-response relationship using one or more sensitive species. The organisms are exposed to different concentrations of the toxicant for different time periods and the resulting adverse effects are used to define the dose-response relationship. There are two important limitations of the methods. First, for practical reasons when three major variables (species, concentration and exposure time) are involved, there are limits to the number and time-length of these exposure tests. For instance, laboratory analyses may be able to expose sensitive organisms to calibrated concentrations of the pollutant for days or weeks, but not months or years. Hence, the long-term effects of continuous exposure to most toxicants typically are largely unknown. Second, there are limits to measuring toxicity. Third, toxicity alone is not necessarily the only issue. For instance, changing the hardness of water, independent of toxic effects, may have significant impacts on aquatic life. Native species that are acclimated and thrive in soft water may be at a disadvantage to species that perform better in hard water. The hard water is not toxic to the native soft-water species, they just lose out in the competition to better adapted species in the same or similar ecological niche.

The  $Q_{7-10}$  design flow reflects the limitations of laboratory dose-response toxicity testing and the underlying bases. New criteria are developed with the same underlying limitations and conditions. The  $Q_{7-10}$  design flow prevents nontoxicity effects from manifesting because it assures that the fundamental nature of the receiving

water is not changed. Reliance on other methods that allow for higher discharge loading rates moves away from the dose-response model and may pose altering the fundamental nature of the receiving water.

Pennsylvania Marcellus Shale-related solids will be present in massive quantities. The constituents of greatest concern, especially chloride, do not volatilize or degrade and would remain mostly in the dissolved, bioavailable phase. The sequential loadings of the conservative solids discharged from multiple facilities would accumulate in the receiving water, with dilution the only mitigating factor. The  $Q_{7-10}$  design flow condition is more important than ever, given the nature of TDS and its component solids, to preserve the fundamental nature of the receiving waters as freshwater streams and rivers typical of this Commonwealth.

*Protection of Drinking Water*

Water suppliers were generally supportive of the intent of the final-form rulemaking because it will provide more assurance that levels of TDS, a secondary maximum contaminant for drinking water, are not exceeded at the point of intake. Commentators recognized the benefits of the final-form rulemaking but did offer suggested revisions. Those suggestions included support for a watershed based approach. In addition, comments from some water suppliers also included support for technology based limits targeted toward new sources of high-TDS discharges.

Water suppliers noted that the cost of removal of TDS by water suppliers should be considered as well as additional costs such as notification requirements when secondary maximum contaminant levels (MCLs) are exceeded. There are 349 drinking water suppliers in this Commonwealth that rely on surface water or groundwater under the direct influence of surface water as their primary sources. The impact of not implementing a discharge standard that provides adequate protection to streams and downstream water suppliers would necessitate many of those suppliers to install treatment technologies for TDS removal. While it is true that this treatment may not be necessary at all times, installation for cases in which it is warranted would still be necessary and costly. These costs would be borne by the rate-payers of these water systems.

As the Department examined the cost-effectiveness of the final-form rulemaking, it was clear that good public policy dictates that the responsibility for the treatment and removal of TDS should not fall to the water suppliers and their customers. The approach the Board has taken in this final-form rulemaking ensures that this cost will not be borne by these end users.

*E. Summary of Changes to the Proposed Rulemaking*

*§ 95.10(a)—Existing Versus New and Expanding—De minimis*

Final-form § 95.10(a) (relating to treatment requirements for new and expanding mass loadings of Total Dissolved Solids (TDS)) differs from the proposed rulemaking. Specifically, this subsection of the proposed rulemaking defined “high-TDS” discharges as those discharges that did not exist on April 1, 2009, and that contain TDS concentrations greater than 2,000 mg/L or TDS loads of more than 100,000 lbs/day. The intent was to only regulate these discharges under the effluent standards proposed in § 95.10(b).

The approach in the proposed rulemaking resulted in a great deal of confusion on the part of regulated dischargers. The Department received numerous telephone calls and comments from dischargers who assumed they would be subject to the effluent standards but who had discharges that would not have been applicable to the proposed rulemaking. These dischargers knew their effluent concentrations were greater than 500 mg/L and thus assumed they would have to provide treatment, when in fact the discharge did not exceed 2,000 mg/L and the discharge would have been exempt from the final-form rulemaking.

Further, many existing dischargers assumed this exemption would only apply until the next time their permit was to be renewed. They assumed they would then be subject to the requirements for new and expanding discharges, even though they were not expanding. In addition, many dischargers assumed that moving their existing discharge from one location to another, without changing the actual TDS loading, would result in a new discharge, thus invoking the effluent standards. This was most noted by the mining industry.

From the inception of the rule, the intent of the Board was to exempt existing discharges, and insignificant discharges, from the effluent standards aimed at controlling the new, larger source of TDS. The majority of watersheds in this Commonwealth did not exhibit violations of water quality criteria and Department analyses showed that even with these existing discharges assimilative capacity remained. It was the threat to this available assimilative capacity from new loads of TDS, most notably from the new Marcellus shale gas operations (see discussion of § 95.10(b)) that prompted the Department to take a proactive step to prevent future compromises to water quality standards through the proposed rulemaking.

Therefore, the final-form rulemaking changes the approach for identifying those larger, new and expanding loads of TDS that would be subject to this regulation. Instead of defining those discharges that are to be included by defining “high-TDS,” this final-form rulemaking specifically identifies those existing and smaller discharges of TDS that are not subject to this regulation. The Board believes that this approach provides clarity and improves the regulation.

*§ 95.10(a)(1).* This section makes it clear that discharge loads of TDS authorized by the Department, under

NPDES permits or other authority that were issued or reissued prior to the effective date of this final-form rulemaking, are exempt from the regulation until the net load is to be increased. It is important to note that only an increase in net TDS load is considered to be a new or expanding discharge loading.

Discharge loads of TDS may be authorized by the Department without actual effluent limitations or monitoring requirements having been placed in an NPDES permit. In most cases, discharge TDS data (or in the case of mining operations, specific conductivity and sulfates data) are submitted with the sample results required for permit applications. Upon review of those data, the Department may determine that these loads do not pose a threat to receiving water quality and thus limitation are not needed. In these cases, the TDS discharge has been authorized, but not limited. Therefore, if TDS (or conductivity) data have been reviewed by the Department as part of an application for an authorized discharge, the discharge load of TDS has been authorized upon issuance of the permit (or other vehicle), regardless of whether there is an actual limitation or monitoring requirement.

Further, the Board also recognizes that discharges from industries are production-based. A currently-authorized discharge load may not reflect past authorizations due to changes in product lines or current economic conditions. Therefore, the regulation identifies the existing discharge load of TDS as the maximum daily discharge load authorized “prior to” the effective date of the final-form rulemaking. This provision allows a discharger to have past authorized, or preexisting, TDS loads considered as existing loads.

Currently, authorized loadings of TDS, and its components such as sulfates and chlorides, are considered to be the existing discharge loads, even if the facility has in fact typically discharged at a lower load than that authorized by its permit. If a facility applies for a net increase in its authorized TDS loading rate, only the amount of the net increase in its authorized TDS loading will be considered as a new and expanding discharge of TDS subject to the requirements in this rule. The section also clarifies that authorized loads are not subject to the rule if they are merely being combined or relocated from one point in a watershed to another, so long as net mass loadings are not increased by the combination or relocation activity. This section also clarifies that existing waste treatment facilities, such as POTWs and CWTs, that accept and treat wastes from other industries or sources under existing permit authorizations are not subject to this rule, so long as net mass loadings accepted and treated are not increased.

The Department also received inquiries regarding the proper method for establishing existing discharge loads for the purpose of separating them from proposed load expansions. Guidance materials will be developed to accompany this regulation and will be completed prior to the rule becoming effective. When an expansion is contemplated, the existing discharge loads can be established through sampling of the existing discharge. At least ten daily composite samples, representative of the discharge during normal operations and taken at least 1 week apart, should be adequate to characterize the existing discharge load. These samples can then be averaged to determine the average daily load. Note that this is a mass loading, thus flow measurements at the time of sampling are necessary.

Finally, it should be noted that the requirements in § 95.10 are expected to be implemented through the

Department's administration of the NPDES permitting program. Section 95.10 sets forth treatment requirements which will be implemented in accordance with the framework established by § 92.2a (relating to treatment requirements).

§ 95.10(a)(2). This section clarifies that abandoned mine sites eligible for funding under sections 101, 102, 201 and 401—415 of the Surface Mining Control and Reclamation Act of 1977 (SMCRA) are not considered new and expanding loadings of TDS. Sections 402(g)(4) and 404 of the SMCRA (30 U.S.C.S. §§ 1232(g)(4) and 1234) describe eligible abandoned mine lands; these include lands and water affected by mining and abandoned or left in an inadequate reclamation status prior to August 1977 when the SMCRA was enacted, and sites for which an inadequate bond was forfeited after 1977 and prior to July 1982 when the Commonwealth obtained primary jurisdiction over surface coal mining operations within this Commonwealth. These discharges are clearly not new or expanding loadings of TDS. Moreover, while the Board recognizes that existing discharges from abandoned mine lands substantially contribute to TDS loadings in surface waters, treatment facilities for these discharges are constructed, operated and maintained by the Department itself or by nonprofit watershed groups working in conjunction with the Department. Title IV grants, and other grant funds, are used for this purpose, and the remediation of the legacy of abandoned mine drainage in this Commonwealth is an enormous project which will take many years to accomplish. The Department will retain flexibility to direct scarce Commonwealth resources to treat abandoned mine discharges in a manner which is both cost-effective and achieves the best overall pollution prevention within a watershed.

§ 95.10(a)(3). This section clarifies that surface coal mining operations engaged in remining, with preexisting discharges of TDS covered by the remining regulations in Chapters 87, 88 and 90 (relating to surface mining of coal; anthracite coal; and coal refuse disposal), are not considered new and expanding sources of TDS. Based on sampling data, the Board generally expects that discharges of TDS from erosion and sediment control facilities at surface mining operations will be de minimis. However, preexisting abandoned discharges can contain somewhat higher loadings of TDS. An exception for preexisting discharges covered by remining regulatory requirements is being included to assure that remining operations are not discouraged by this regulation. Because these are preexisting discharges of abandoned mine drainage, they are already contributing TDS and sulfates to the receiving stream. More importantly, the remining operation is expected to abate or reduce the pollutant load of these existing abandoned discharges, thereby resulting in an overall improvement to water quality in the watershed. The mining regulations in Chapter 87, Subchapter F, Chapter 88, Subchapter G, and Chapter 90, Subchapter F (relating to surface coal mines: minimum requirements for remining areas with pollutional discharges; anthracite surface mining activities and anthracite bank removal and reclamation activities: minimum requirements for remining areas with pollutional discharges; and coal refuse disposal activities on areas with preexisting pollutional discharges) will continue to provide the applicable criteria for permitting preexisting discharges on remining areas.

§ 95.10(a)(4). This section clarifies that active surface coal mining operations with an open pit dimension of less than 450,000 square feet exposed at any time are exempt

from this regulation. Discharge loads of TDS from these activities are considered to be insignificant.

§ 95.10(a)(5). This section clarifies that TDS discharges from erosion and sediment control facilities used at surface mining activities, which are defined in § 86.1 (relating to definitions), are exempt from this regulation. Discharge loads of TDS from these activities are considered to be insignificant.

§ 95.10(a)(6). This section clarifies that existing mine drainage that is directed to mine pools for further treatment through the pool are exempt from this rule. The mine pool water must be undergoing treatment in accordance with Chapters 91—96. Like the exception for remining, this provision is being included to assure that certain projects involving reclamation of unreclaimed coal refuse piles with existing mine drainage are not discouraged by this regulation.

§ 95.10(a)(7). This section establishes a de minimis loading for new and expanding discharges, exempting small discharges and small increases in discharges from this regulation. New or increased net loads of TDS that total less than 5,000 lbs/day as an annual average daily load are considered to be de minimis and exempt.

§ 95.10(a)(8). This section exempts those dischargers of TDS for which Federal regulations have established effluent limitation guidelines (ELGs) for TDS, chlorides or sulfates. This regulation is not intended to supersede requirements the EPA establishes, or has established, in the form of Best Available Treatment Technology economically achievable (BAT), Best Available Control Technology (BCT) or new source performance standards for a specific industrial subcategory for any of these three parameters. These discharges will be exempt from this regulation.

The Board recognizes that there are industries for which the EPA has determined, as part of the ELG development process, that BAT, BCT and new source standards for TDS, chlorides or sulfates are not necessary. Discharges of TDS from these sources may be exempt from this rule, depending on the EPA reasoning for not establishing a technology-based limitation. These situations will be reviewed by the Department upon formal written request on a case-by-case basis.

#### § 95.10(b)—Sector-Based Approach for the Oil and Gas Industry

§ 95.10(b)(1). This section prohibits discharges to waters of this Commonwealth of wastewater resulting from fracturing, production, field exploration, drilling or well completion of natural gas wells. This section is consistent with the Federal ELG for the on-shore oil and gas industrial subcategory in 40 CFR Part 435 (relating to oil and gas extraction point source category).

§ 95.10(b)(2). In response to concerns raised by WRAC and by the natural gas industry itself, the Board modified the recycling mandate that was contained in the draft final version of the regulation presented to WRAC at its April 14, 2010, meeting. The language in the regulation was changed to promote recycling and requires the development of a waste reduction strategy. The purpose of this change is to drive maximum recycling and reuse of these wastewaters to reduce treatment and disposal threats to streams, treatment and disposal costs to the industry and costs to the industry and taxpayers in the form of wear and tear on state and local highways.

Concern was voiced that the application of the new TDS standards to conventional shallow gas operations may force the premature abandonment of shallow gas

production in this Commonwealth because this section required operators to recycle those wastewaters. By removing the mandate to recycle, the Board believes it has addressed this concern. The Board fully understands that conventional gas well operators confront economic concerns unlike those faced by the new Marcellus operators. Many of these smaller, conventional operators will be unable to recycle their wastewaters because of the marginal economics of the wells. The operators will still have the disposal at existing treatment facilities option available to manage their wastewaters.

In addition, the concern that conventional brine treatment facilities cannot operate under the proposed rule is without basis. Wastewaters may continue to be sent to existing brine treatment facilities that have historically accepted and treated them. These existing facilities may continue to operate under their existing permits and are not necessarily required to install new treatment. A new or "expanding mass loading" of TDS from these existing facilities would require them to comply with the new TDS standards in this regulation. Contrary to misperception, this new requirement does not apply to existing facilities simply when the current NPDES permit term expires. Section 95.10(a)(1) was amended to add further clarity in this regard.

§ 95.10(b)(3). This section provides that new or expanding treated discharges of wastewaters resulting from natural gas well operations may be authorized under an NPDES permit under specific conditions:

§ 95.10(b)(3)(i). The wastewater is hauled to and treated at a permitted CWT facility as this term is defined in 40 CFR 437.2(c) (relating to general definitions). A CWT means any facility that treats for disposal, recycling or recovery of material, hazardous or nonhazardous industrial wastes, hazardous or nonhazardous industrial wastewater, or used material received from offsite. Notably, the definition for CWT facility in 40 CFR 437.2(c) states that the term includes both a facility that treats waste received exclusively from offsite and a facility that treats wastes generated onsite as well as waste received from offsite. This allows for a range of industrial waste treatment facilities to take gas drilling wastewater for treatment, so long as the facility meets the effluent requirements in § 95.10(b).

§ 95.10(b)(3)(ii). The wastewater may not be discharged directly to a POTW without first receiving pretreatment at a permitted CWT. The final rule governing natural gas industry wastewater disposal at POTWs is different than the proposed rule and the April 2009 TDS permitting strategy. Under that strategy, the Department would have allowed POTWs to discharge high TDS wastewaters provided they obtained EPA approval of a pretreatment program under 40 CFR Part 403 (relating to general pretreatment regulations for existing and new sources of pollution) and install appropriate pretreatment facilities. The strategy also would have allowed acceptance of these wastewaters by POTWs only if they met all applicable effluent limits and treatment requirements necessary to protect downstream water supply intakes.

The final rule is aimed at discouraging POTWs that are not currently approved to accept these wastes from doing so. POTWs do not provide treatment of TDS. They merely pass TDS through their treatment process by means of a dilution. Accepting these high-TDS loads has the very real potential to ruin the POTW's biological treatment process, causing significant noncompliance. Therefore, the final rule establishes that POTWs may accept these wastewaters only if the wastes are first treated at a CWT

facility and meet the end-of-pipe effluent standards imposed by the rule. In effect, the final rule regulates these indirect discharges in a manner consistent with direct discharges of these wastes. Again, it is important to note that the majority of other gas-producing states do not allow the surface water discharge of this wastewater at all. Underground injection and nondischarge options are the norm in those states. This rule encourages those options in this Commonwealth.

§ 95.10(b)(3)(iii)—(vii). CWTs treating this wastewater must meet the effluent requirements contained in these subparagraphs.

§ 95.10(b)(4). This section specifies that when these wastewaters are hauled to sites for deep underground injection in this Commonwealth, the sites shall comply not only with the Federal underground injection control requirements but also with § 78.18 (relating to disposal and enhanced recovery well permits), when applicable.

§ 95.10(c)—*Effluent Standards for Other than Oil and Gas*

This section establishes the effluent standard of 2,000 mg/L for TDS for all industrial sectors other than oil and gas and provides an optional variance provision, which is detailed in the following section. As previously stated, inorganic TDS is known as a conservative parameter, meaning that TDS is not subject to fate during transport in the water column. Cumulative loadings of TDS from multiple discharges upstream of these intakes can cause violations of water quality criteria at design conditions and result in the need for an allocation strategy. These allocation strategies are inequitable unless the same requirements apply to all contributing discharges, independent of the location of each discharge in the watershed.

The Board addressed this issue and the comments received from the various potentially-affected industries in this final rule. The approach establishes an effluent standard for sectors (other than natural gas well operations) at 2,000 mg/L and allows a variance from this standard under certain conditions specific to the watershed in which the discharge is located. The 2,000 mg/L as a monthly average standard was selected for several reasons. First, it is the bar set in the proposed regulation for a high-TDS discharge, meaning that TDS-containing discharges from most industrial sectors and POTWs do not contain more than 2,000 mg/L TDS and thus would not be subject to this rule. Moreover, unless the discharge flow volume is quite low, a discharge containing greater than 2,000 mg/L will have a TDS loading rate that significantly impacts the assimilative capacity of the receiving stream, even if that stream has substantial flow volume. Second, the rule applies only to new and expanding loads of TDS, not the existing loads, making it more easily achieved and enabling industries that will be affected to plan their operations to meet the new standard. Finally, while the end-of-pipe 2,000 mg/L standard is less stringent than the instream water quality criterion, it is within four to five times that value and in the Department's Best Professional Judgment assures that adequate instream dilution will be available to prevent exceeding the water quality standard.

§ 95.10(d)—*Variance Provision*

Variances to this standard can be approved by the Department provided that the applicant can demonstrate the need for a variance. The demonstration shall be based on the character of the wastewater, the availability of treatment technologies and the costs associated with

meeting the standard. These variances are not without limitations. The Department will develop guidance materials to assist applicants in the completion of requests for variances prior to the effective date of this regulation.

§ 95.10(e)—*Variance Request Subject to Public Notice*

This provision establishes that a request for a variance submitted to the Department in accordance with § 95.10(c) will be required to comply with the public notice provisions applicable to NPDES permit applications in § 92.61 (relating to public notice of permit application and public hearing). The basic contents for the variance request are stated in § 95.10(d) and the Department will develop forms to be used when submitting a variance request. However, given that a variance will generally be included as part of an NPDES permit, this section makes clear that the variance request shall comply with public notice procedures used for NPDES permit applications.

§ 95.10(f)—*Department Approval of Variances*

Under the rule, an upper bound that limits the degree a discharge can vary from the standard will be established based on water quality considerations. This upper bound is set to assure that at the point of discharge existing uses are maintained and water quality standards, both numeric and narrative, are not compromised.

In addition, a watershed analysis must assure that the cumulative TDS load from all sources at the next downstream PWS intake does not exceed 75% of the water quality-based assimilative capacity at design stream flow conditions, as required in § 96.3, that is,  $Q_{7-10}$ . The Department will closely monitor TDS levels and take steps necessary to limit increased or future discharges and prevent water quality criteria violations. When the remaining assimilative capacity of a receiving stream falls below 25%, based on analysis at design stream flow conditions, the Department will develop a wasteload allocation for discharges of TDS that contribute to the specific water quality standards compliance point. For this evaluation, a watershed will consist of that area that drains to a PWS, which also is the water quality standards compliance point.

§ 95.10(g)—*Compliance Date for Coal-Fired Electric Steam Generating Units*

Coal-fired electric steam generating units have expressed concern over the timing of compliance with the requirements in this regulation and difficulties in planning, designing and constructing the necessary treatment equipment on account of an overlap with new air pollution control requirements, and the pending issuance of an ELG for TDS for this industrial category (that is, subject to 40 CFR Part 423 (relating to steam electric power generating point source category)). Two new EPA regulations—the Clean Air Interstate Rule (CAIR), see 70 FR 25162 (May 12, 2005), and the Clean Air Mercury Rule (CAMR), see 70 FR 28606 (May 18, 2005)—will require these facilities to install scrubbers or other air pollution control equipment which will ultimately generate wastewater with high TDS loadings. These regulations have not yet been finalized. The EPA is also currently developing an ELG for TDS for this industrial subcategory which is scheduled for completion by March 2014 (Docket No. EPA-HQ-OW-2009-0819). The industry has provided estimates of the time needed (approximately 3 years) to plan, design and construct treatment facilities for wastewater from the new air pollution control equipment installed to meet the CAIR.

The overlap of the wastewater treatment requirements in this regulation with the air pollution control requirements in the CAIR and the CAMR and the development of an ELG for TDS by the EPA scheduled for issuance in March 2014, necessitates establishment of a later compliance date for these industrial facilities. This section provides that coal-fired electric steam generating units will have additional time to come into compliance with the wastewater treatment requirements in § 95.10(c). These facilities shall comply with the requirements in § 95.10(c) by December 31, 2018. This section also recognizes that discharges from these facilities may still qualify for exemptions established by § 95.10(a), such as those in subsection (a)(1) for existing mass loadings of TDS authorized prior to the effective date of this regulation or for new and expanding loadings less than 5,000 lbs/day as an annual average daily load in subsection (a)(7). Finally, if an applicable effluent limit guideline is established by the EPA for this industrial subcategory, as is currently expected in March 2014, discharges from these facilities may qualify for the exemption in subsection (a)(8).

F. *Summary of Comments and Responses on the Proposed Rulemaking*

The Board approved publication of the proposed rulemaking at its meeting on August 18, 2009. The proposed rulemaking was published at 39 Pa.B. 6467 with a 90-day comment period. Due to a publishing error in the proposed rulemaking that listed an incorrect e-mail address for the Board, a correction to the proposed rulemaking was published at 39 Pa.B. 654. The Board advertised that the comment period for the proposed rulemaking was extended by 7 days. The public comment period officially closed on February 12, 2010. In addition, four public hearings were held as follows: December 14, 2009, in Cranberry Township, Butler County; December 15, 2009, in Ebensburg, Cambria County; December 16, 2009, in Williamsport, Lycoming County; and December 18, 2009, in Allentown, Lehigh County.

During the comment period, the Allegheny Conference, the PCA, the MSC and the Chamber submitted comments that questioned the need for the regulation based on their review of watershed data. The Board's response to these comments follows. Responses are also in the Background section of this preamble.

*Allegheny Conference*

The Allegheny Conference provided two major comments:

- There was an absence of scientific data to support the regulation.
- There was the potential for the proposed rule to seriously damage the economy of southwestern Pennsylvania and this Commonwealth.

The final-form rulemaking has been amended to address many of the issues identified in regard to economic effects by clarifying the misunderstanding of many industries as to how this rule would impact them, especially in the Monongahela River watershed. In the Monongahela, TDS levels have already exceeded water quality criteria. This means that allocations of TDS loads must be made for all dischargers in the watershed to bring the river back to compliance. The Department will be listing the Monongahela as impaired on its upcoming impaired waters list as required by the Clean Water Act (33 U.S.C.A. §§ 1251—1376).

In other watersheds, the Board recognizes that high-TDS wastewaters from different industries present differ-

ent treatment challenges. Not all industrial wastewaters containing TDS are consistent. Based on the need for regulation of a rapidly expanding industry which generates wastewaters with extraordinarily high levels of TDS and chlorides, the readily available proven treatment technologies for this wastewater, the low costs associated with treatment and the overwhelming public comment in favor of a standard for this industry, the proposed rulemaking refined its original focus on treatment for oil and gas wastewaters. The final-form rulemaking now contains more specific treatment requirements for wastewater generated from all natural gas drilling activities and provides exemptions and an option variance provision for non-natural gas industries designed in part to address economic issues identified.

With regard to their comment on the lack of scientific data to support the regulation, the Allegheny Conference unfortunately discounted important evidence. Their analysis used a simple frequency analysis, but the Department's WQN data set contains an adequate number of independent observations that allow more powerful statistical distribution tests, as outlined in the 2009 Assessment and Listing Methodology ([http://www.portal.state.pa.us/portal/server.pt/community/water\\_quality\\_standards/10556/2009\\_assessment\\_methodology/666876](http://www.portal.state.pa.us/portal/server.pt/community/water_quality_standards/10556/2009_assessment_methodology/666876)). The Department's analyses of watersheds across this Commonwealth were conducted using these more rigorous methods. When the Department's analyses of WQN data showed the potential for water quality criteria violations, detailed studies were conducted in those watersheds.

First, conductivity is highly correlated with TDS and conductivity can be monitored continuously using probes. Although discrete TDS samples at the WQN sites in the Monongahela River may not fully elucidate the problem of increasing TDS, the continuous monitoring of conductivity is convincing. This increase in conductivity prompted the Department to conduct chemical grab sampling in various pools in the Monongahela in 2008 and 2009. Careful analysis of these samples, taking into consideration both the frequency and duration components of water quality criteria, showed they exceeded the 500 mg/L PWS TDS criteria in pools with drinking water intakes.

The Allegheny Conference comments that "The spikes recorded in 2007-2009, after a decade of readings below 500 parts per million, indicate a condition worth studying to understand its nature and severity, but a handful of samples is not enough to justify a new set of regulations for the entire state." The spikes in fact did elicit more study as the Department began systematically collecting additional grab samples in the Monongahela. The result was the discovery of a severe TDS problem in the river leading to an impairment listing. Uncovering the severity of this problem prompted the Department to recognize the need to deploy more continuous conductivity probes in other waters to learn whether the TDS problem is more widespread than just the Monongahela.

The assessment process by the Department in the Beaver River watershed is the same as that in the Monongahela. The potential for a TDS problem has been identified from WQN data, and the Department is responding by collecting grab samples and deploying conductivity probes. It takes time to collect the data, but when an adequate number of samples become available the Department will not simply rely upon a WQN frequency analysis, as suggested, but must consider the entire weight of evidence. Similar assessments of WQN data were made for the West and North Branches of the Susquehanna River, the Clarion River and Moshannon Creek, which were previously discussed.

Allegheny Conference omits any mention of the environmental disaster in Dunkard Creek that devastated 26 miles of that stream. The problem was high TDS concentrations leading to colonization and growth of golden algae, as well as osmotic pressure exceeding the regulatory numeric criterion. Dunkard Creek is a good example of what can happen if TDS is not controlled, and the loss of this important public resource was an environmental tragedy, documented by the loss of aquatic life, including endangered mussels.

Allegheny Conference's analysis of the WQN data can in no way be considered a risk assessment with any merit. Based on their simple frequency analysis the Conference suggests that the Board should delay any regulations because their analysis does not show many 500 mg/L exceedance at WQN sites. As previously documented, the WQN data can be used to calculate the background TDS concentration at each site and from that determine how much additional TDS load can be added before there is environmental harm. This is done by computing the assimilative capacity at  $Q_{7-10}$  design flow, and is a much more robust risk assessment.

#### PCA

The Board received significant comments from the PCA. In addition, the PCA participated in the TDS Stakeholders Subcommittee and provided a detailed presentation of how the PCA believed this regulation would affect their industry. Finally, the PCA also submitted comments to the Independent Regulatory Review Committee (IRRC), which were in turn submitted to the Board.

The PCA comments opposed the regulation for several reasons. First, the PCA assumed that at some point in time the Board would regulate all sources of high-TDS as new or expanding discharges, thus negating any exemptions. Second, the large volumes of mine drainage would be considered high-TDS, not because of their concentrations but because of the TDS loadings, and that all discharges from mining activities would eventually be regulated. The PCA added together the cumulative costs across the industry for treating TDS for all of its activities and discharges, including legacy operations for which their membership is currently responsible, and developed an estimate of the total industry costs to comply. Needless to say, when estimated in this manner, that cost was astronomical.

Upon Board review of the PCA comments, the IRRC comments and the PCA presentation to the TDS Stakeholders Subcommittee, it was apparent that the Board's intent to exempt existing loads of TDS from mining activities was not clearly discernable in the proposed rule as written. It was never the intention of the Board to capture these existing discharge loads of TDS from this industry in this regulation. The regulation was intended only to capture new loadings of high-TDS wastewater.

Therefore, in this final-form rulemaking the Board restructured the proposed rule to include § 95.10(a), intended to more clearly define those existing sources of TDS that are not subject to the rule. Specific concerns identified by the PCA are addressed in § 95.10(a)(1)–(6). Further details on the intent of these sections are described later in this preamble.

#### MSC

The Board also received comments from the MSC. In addition, the MSC and the POGAM were represented on the TDS Stakeholders Subcommittee. The new Marcellus shale play in this Commonwealth and the projected

wastewater treatment and disposal needs from that new industry was the primary impetus for the Board's proposing this new rule.

In these TDS Stakeholders Subcommittee meetings, the MSC and POGAM provided data, arguments and a presentation aimed at convincing the Board that, with a drier Marcellus formation than anticipated and new recycle and reuse practices, the projected need for treatment and disposal was an order of magnitude less than original projections. These groups representing the oil and gas industry in this Commonwealth argued that there was not a need for this regulation and that real-time flow management practices, which simply allow dilution of TDS loads in streams in this Commonwealth, were adequate to manage these new loads. They also proposed that increased energy demand from the limited treatment technologies would create worse pollution effects in media other than water, for example, air.

Further, the industry argues both that technology has not been fully developed to treat these wastes, and that the "significant" costs associated with the technology may inhibit the development of the new Marcellus gas play in this Commonwealth. The industry disputes the Board's treatment cost estimate, provided in the preamble for the proposed rule at approximately 25¢ per gallon, saying that the actual costs will be much higher.

The MSC was opposed to the proposed regulation as unnecessary. The Department conducted a thorough review of the information and the data presented by this industry, by treatment manufacturers and vendors, from existing treatment operations in this Commonwealth and other states and from full-scale pilot treatment studies. Based on this review, the Board does not agree that real-time flow management complies with water quality standards requirements, that there is no longer a need for this regulation, that technology has yet to be developed or that its original cost estimate of approximately 25¢ per gallon is either inaccurate or prohibitive.

This final-form rulemaking includes new § 95.10(b) that is specific to the oil and gas industrial category, which continues to include effluent standards designed to drive treatment of the wastewater to be disposed by this industry. At the recommendation of the TDS Stakeholders Subcommittee, this final-form rulemaking also includes incentives for recycling and reuse of these flow back wastewaters intended to minimize the amount of wastewater to be disposed. Further discussion on real-time flow management, wastewater treatment and disposal needs, potential multimedia pollution, treatment technologies and treatment costs can be found in this preamble.

#### *Chamber*

After considerable review of the comments from the Chamber, the Board agrees that a different path forward is warranted. The Chamber accurately pointed out that the rule as proposed captures a very broad and varied spectrum of industries across this Commonwealth. As noted by the Chamber, these industries produce a wide array of different wastewaters containing TDS, and that a sector-by-sector approach to controlling TDS is likely the best option. The Department has heeded that recommendation and the final rule reflects a change in approach.

In addition, the Chamber also noted that TDS cannot simply be ignored, recognizing that if not addressed or controlled in some manner, certain watersheds could exceed water quality standards, adversely affecting drinking water supplies and aquatic life. The Chamber recommends a watershed-by-watershed approach be pursued by the Board to avoid this potential problem.

The Chamber provided comments similar to the Allegheny Conference, PCA and the MSC regarding the degree to which our watersheds are in jeopardy from TDS. In addition, the Chamber recommends a form of flow management as a potential solution for controlling TDS. Analyses by the Department, addressed in this preamble, are real, accurate and based on compliance with State and Federal standards. These analyses document that in many watersheds the assimilative capacity is much closer to being exceeded, at design stream flow conditions, than is evidenced by a simplistic plot of monthly sample results and spikes over time. Further, at the initial meeting of the TDS Stakeholders Subcommittee, the Department presented statistical and scientific reasoning rejecting flow management as an option.

In this final-form rulemaking the Board restructured the proposed rule to include § 95.10(a) intended to more clearly define those existing sources of TDS that are not subject to the rule. Specific concerns identified by the PCA are addressed in § 95.10(a)(1)–(6). In addition, the Board recognized that different industries have different wastewaters. However, as described in the discussion regarding § 95.10(c), not establishing some level of performance for addressing TDS from these industries (other than oil and gas) results in significant economic inequities between industrial sectors. The final rule proposes a Statewide standard of 2,000 mg/L for these industries, with a variance provision that is based on a watershed assimilative capacity analysis. Further details on the intent of these sections are described in this preamble.

The following is a summary of other comments received during the public comment period, organized according to subject matter.

#### *Drilling-Related Comments*

Drilling-related comments are those comments that seemed to be targeted at the natural gas industry and, in some cases, more specifically the drilling and hydraulic fracturing of gas wells. Since this final-form rulemaking is primarily to establish wastewater treatment requirements for wastewaters containing TDS, many of the comments in this category were not applicable to the rule. They are listed here to demonstrate that much of the public comment focused on regulating the natural gas industry.

*Comment:* The fracking industry uses poisonous cocktails of contaminants. The Commonwealth and its citizens have a right to know and the drilling companies have an obligation to tell us what they are putting into the ground when they perform hydrofrack activities regardless of whether the chemicals are corporate secrets. Our groundwater and streams need to be protected from these chemicals. Set health-based standards for all contaminants that may be found in wastewater gas drilling including arsenic, benzene, radium, magnesium, volatile organic compounds, and radioactivity. The proposed standards are not stringent enough to protect our streams and additional steps need to be taken by PA DEP now to prevent further degradation of the State's waterways and water resources.

*Response:* The Department knows what additives are used in the fracturing process and sampled flow back waters to determine the relative quantities of these constituents. The Department has posted a list of these chemicals on its web site at <http://www.dep.state.pa.us/dep/deputate/minres/oilgas/FractListing.pdf>.

Current well construction standards are designed to protect groundwater resources from any contamination

that could result from drilling and fracturing wells and the Department has recently taken steps through new regulations to make those standards even more protective.

The Commonwealth currently has health-based standards in place for arsenic, benzene, radium exposure to radiation and volatile organic compounds. These standards are found in the drinking water MCLs and the water quality standards for surface waters in this Commonwealth. These standards are based on sound science and are as stringent as they need to be to protect the public health and streams in this Commonwealth.

*Comment:* The high pressure hydraulic fracturing technology invented by Halliburton, now located in Dubai, has been used in TX, WY, western PA, and CO with disastrous consequences. There have been fires, explosions, and other “accidents” in all of these other places around the country, making many farms, ranches, and homesteads uninhabitable. There should be mandated buffer zones between well site and drinking water sources, wetlands, or streams.

*Response:* This final-form rulemaking addresses effluent standards for the treatment of wastewaters containing TDS. This comment is not applicable to this final-form rulemaking.

*Comment:* Opening land to drilling has the potential to pollute surface and ground water resources. Enact a moratorium on leasing public land for gas drilling until an impact analysis can be done. Severely limit the number of wells in one area. Drilling the number of wells that they are drilling significantly dilutes the environmental quality of these pristine lands. Once damaged, it may take decades or centuries for them to return to their former state, if ever.

*Response:* This final-form rulemaking addresses effluent standards for the treatment of wastewaters containing TDS. This comment is not applicable to this rulemaking.

*Comment:* We need to make sure especially that our very best waterways, those designated as Exceptional Value or High Quality, as well as all sources of our public and private drinking water, are fully protected. Prohibit O&D drilling in EV watersheds. Testing water quality before, during, and after drilling should be mandatory, not voluntary. Require individual permits for gas development in HQ watersheds. Inspect each well during each phase—siting, drilling, casing, connecting, altering, and stimulating. Must consider cumulative impacts of drilling in watersheds.

*Response:* This final-form rulemaking addresses effluent standards for the treatment of wastewaters containing TDS. This comment is not applicable to this rulemaking.

*Comment:* Demand safe and biodegradable fracking chemicals in PA. Many people in Dimrock have already had their wells contaminated. Use the methods of the offshore oil and gas drilling in European waters where chemicals must be nontoxic in case of spills into the waters. Use less toxic “fracing” chemicals by implementing best practices identified by researchers at Texas A&M University’s Global Petroleum Research Institute, as a start.

*Response:* The final-form rulemaking promotes reuse of fracturing fluids as suggested.

*Comment:* Require recycling and reuse of hydrofracking wastewater. Create regulations to oversee the reuse of

drilling wastewater. There is little oversight over the reuse of drilling wastewater and whether in fact this is a waste disposal method as opposed to closed loop water recycling. Mandate closed-loop systems for managing wastewater, as well as steel tanks to contain the concentrated leftovers.

*Response:* The final-form rulemaking promotes reuse of fracturing fluids as suggested.

*Comment:* Require “cradle-to-grave” tracking of wastewater from drilling sites from generation through treatment and disposal. Do not allow the use of brine for dust control on dirt roads, since many of these roads are used for recreational purposes. No frackwater treated or untreated should go into our streams. Marcellus “frackwater” should not be left in lined lagoons during any stage of the process.

*Response:* This type of tracking is already required under Chapters 287—299, regarding residual waste. The final-form rulemaking establishes treatment standards for this wastewater that shall be met, which are protective of the uses of receiving streams, prior to discharge to surface water, as suggested.

*Comment:* We should be vigilant to threats to the quality of our waters. We also should learn from past mistakes: we are still paying to clean up acid mine drainage and other water pollution left as a legacy of lax regulation of the coal industry in times past. With the expansion of Marcellus gas drilling in Pennsylvania, we need to have strong protective measures in place before another disaster like the 2009 Dunkard Creek incident occurs.

*Response:* The final-form rulemaking establishes treatment standards for this wastewater that shall be met, which are protective of the uses of receiving streams, prior to any discharge to surface water, as suggested.

*Comment:* The proposed new regulations on TDS have already had a very positive result. The gas drilling industry has quickly moved to develop wastewater management strategies that rely on recycling. The gas exploration industry is very well funded and technically based. They have the means, as they already have proven, to respond to the challenges of their own wastewater. Put to the task, this industry is developing strategies that other industries can follow. These new technologies will translate into good, home grown jobs. Please hold the line on the proposed new standards. They are not perfect, but they are a very good start.

*Response:* The Board appreciates this comment.

*Comment:* These drillers need to be strictly regulated and they need to be taxed. This is no fledgling industry. With the good people of Pennsylvania already taxed to the gills, it makes no sense to have these well-organized predatory energy companies lobbying themselves into a free ride.

*Response:* This final-form rulemaking addresses effluent standards for the treatment of wastewaters containing TDS. This comment is not applicable to this final-form rulemaking.

*Comment:* We are concerned that that the projected discharges from drilling operations are greatly overstated and the ability to reuse flow back water has been underestimated.

*Response:* This final-form rulemaking takes a proactive approach to controlling TDS from the natural gas industry. The Marcellus Shale play is indeed in its infancy. The



industry does not yet have answers to most of the questions about the play and, in particular, about the impacts the play could have on the waters of this Commonwealth. The Board's aim is to ensure that future growth of this industry is considered in the rules and regulations it puts in place now.

*Comment:* Streamline residual waste regs for the handling of brines after they have left a production site. Allow the ability for brine transfer stations or transfer operations to operate with streamlined regulations.

*Response:* This final-form rulemaking addresses effluent standards for the treatment of wastewaters containing TDS. This comment is not applicable to this final-form rulemaking.

*Comment:* The targets of this regulation appear to be one-time dischargers, such as the hydrofacking industry. Refocus the regulation to apply to the oil and gas industry only.

*Response:* Based on stakeholder comments received during an extensive public participation process, the final-form rulemaking adopts a combination of recommended approaches for addressing these larger loadings of TDS. This combination of approaches includes an industrial sector-based regulation along with a watershed-based analysis. The sector-based piece focuses on the natural gas industry.

*Comments:* After four decades of demonstrable improvement in water quality, the US Army Corps of Engineer's data shows that conditions are reversing on Pennsylvania's rivers. It is becoming apparent that the assimilative capacity of some rivers to receive TDS, if not already exceeded, is close to being exceeded, and simply cannot sustain the additional loading projected as a result of natural gas exploration activities. In the last two years, evidence of degradation, based on elevated specific conductivity readings recorded at water quality monitors located on the Monongahela River at Elizabeth, OA, the Casselman River at Markelton, PA, and the Conemaugh Dam, in addition to the recent Dunkard Creek aquatic kill, demonstrates that high TDS wastewaters threaten to undermine historical water quality improvements, posing a genuine and extreme threat to regional water quality.

*Response:* The Board agrees, and these facts support the need for this final-form rulemaking.

#### *Mining-Related Comments*

Mining-related comments are those comments that were from the mining industry or were in support of the mining industry. This final-form rulemaking is primarily to establish wastewater treatment requirements for wastewaters containing TDS; however, many believed that it could affect mining operations. The final-form rulemaking has been revised to make it clear that it does not apply to most mining operations.

*Comment:* The lack of regulation and insufficient bonding in the early years of coal mining have caused major environmental damage, requiring years and much money to clean up. Over 3,000 miles of streams are still impaired from that irresponsible behavior. We need to prevent this from happening in the future by regulating discharges of high TDS wastewater.

*Response:* The Board agrees, and this final-form rulemaking takes a proactive approach to controlling TDS from the natural gas industry.

*Comment:* The proposed standards are not based on sound science, are costly, burdensome, unworkable and

therefore, threaten the vitality of the mining industry. Placing obstacles such as this does nothing to retain the jobs we have.

*Response:* From the inception of the final-form rulemaking, the intent of the rule was to exempt existing discharges, and insignificant discharges, from the effluent standards aimed at controlling the new, larger source of TDS. The provisions specifically allow for continued discharges of TDS wastewaters at authorized TDS loading levels and are designed to lessen the effects on existing and small discharges of TDS in this Commonwealth through the exemption and variance provisions. This new regulation will not impact reclamation activities at abandoned mines frequently operated by local watershed groups.

*Comment:* Current discharges from existing waste coal sites that are conducted in an environmentally sound manner should continue to be regulated under existing requirements. We believe that the proposed regulations could prevent remining and reclamation of waste coal sites.

*Response:* The final-form rulemaking exempts discharge loads of TDS authorized prior to August 21, 2010.

*Comment:* Revise 95.10(b)(5) to exempt discharges into mine pools that are permitted under Chapters 87, 88, 89, or 90.

*Response:* The regulation has been changed accordingly.

#### *Health Based Comments*

These were comments regarding the effects on public health that could be impacted by the final-form rulemaking. Most of the comments regarding the protection of drinking water. Most relate to fracking chemicals, but others related to the brominated disinfection byproducts that occurred in the Monongahela River.

*Comment:* There are no currently operating facilities capable of removing TDS. Since public water suppliers cannot treat this type of polluted water, the wastewater should be treated to a degree that would be protective of drinking water prior to discharge. Maintain the proposed treatment standards of 500 mg/L for TDS, and 250 mg/L for sulfates and chlorides.

*Response:* There are technologies that are capable of meeting these standards as noted in this preamble. The standards referenced were maintained for high-TDS wastewaters associated with the natural gas industry. For other industries, a different standard was set, but a variance from that standard can be granted when local streams are able to assimilate the loads without violating water quality standards.

*Comment:* Studies have shown that disinfection byproducts resulting from chemical reactions between disinfectants and organic materials present health risks to humans. The worst of these is brominated water, which has been shown to cause bladder cancer in humans. At present, the Monongahela River, with high concentrations of TDS presents higher levels of several of these contaminants.

*Response:* The Board agrees and cites one of these studies as a reference.

#### *Environmental Comments*

These were comments regarding the effects on the environment that could be impacted by the final-form rulemaking. Many related to harmful effects from an inadequately regulated mining industry. Others are con-

cerned about the quality of streams in this Commonwealth and with aquatic life protection.

*Comment:* The Dunkard Creek tragedy is a good indicator of the consequences of high TDS wastewater discharges into our fresh water streams. The discharge of high TDS wastewater into the stream completely damaged the biological community in the stream by allowing the growth of toxic algae, which can only survive in salt water. The algae was responsible for the destruction of 43 miles of stream, including 161 species of fish, 14 species of freshwater mussels, and other aquatic creatures such as salamanders by dissolving exposed cells, including gills.

*Response:* The Board agrees and this incident was considered in the analysis and the need for the final-form rulemaking.

*Comment:* Watershed analyses conducted by the PA DEP indicate that several rivers are severely limited in their capacity to assimilate new loads of TDS and sulfates—primarily due to acid mine drainage from long-abandoned coal mines—a legacy of Pennsylvania's last energy rush. Increased TDS and sulfate loading would reverse years of hard-won progress by PA DEP in improving water quality in these watersheds.

*Response:* The Board agrees and these facts formed part of the basis for the final-form rulemaking.

*Comment:* DEP has not shown, by monitoring or sampling data, that water resources are at any sustainable risk from TDS concentrations.

*Response:* The Board does not agree. Studies described and others cited in this preamble provide more than a sufficient basis for this final-form rulemaking.

*Comment:* Research in 1997 states that TDS over 400 mg/L has a direct negative affect on the diversity of fish populations. Additional research in 2007 confirms this. It is recommended that the TDS standard be lowered to 400 mg/L.

*Response:* The recommended 400 mg/L standard is an "instream" number that would have to be achieved after mixing and dilution of the discharge with the receiving stream. The Department has reviewed the relevant data and determined that the current osmotic pressure criterion in water quality standards regulations provide protection for aquatic life at the point of discharge. The 500 mg/L standard proposed for the natural gas industry wastewaters is more stringent, as it would be applied at the end of the discharge pipe.

#### *Economic Comments*

These were comments regarding the effects on the economy that could be impacted by the final-form rulemaking, whether large-scale or small-scale. Some commentators felt that the Department did not understand the economic impact of the regulation and some believed that small oil and gas producers would be the hardest hit. Others commented that the regulation would discourage investment in this Commonwealth.

*Comment:* DEP does not fully understand, and has not evaluated, the economic impact this regulation has on industries in PA. The statewide impact will be in the billions of dollars to comply and will put companies of the Commonwealth at a disadvantage with its competitors.

*Response:* The Board does understand and has evaluated, through the TDS Stakeholders Subcommittee process, the rule's effect on a very large cross section of industries in this Commonwealth. To provide greater

clarity to the scope of the regulation, the final-form rulemaking specifically exempts certain classes of TDS discharges from the application of the rule. This approach is designed to clearly exclude from the scope of this regulation all existing loadings of TDS authorized by the Department prior to the effective date of this final-form rulemaking, as well as new and expanding TDS sources, which the Department has determined are insignificant from a loading perspective.

Further, the Board agrees with the comments that were received by industries other than the oil and gas sector that point out that the proposed rulemaking was a one-size-fits-all approach that may not be appropriate. Different industries have vastly different wastewaters, even in the composition of the TDS. There are many different technologies that would be necessary to treat these different wastewaters, and the costs of treatment to a given standard could create an inequitable economic problem.

The Board addressed this issue and the comments received from the industries other than oil and gas in this final-form rulemaking. The approach establishes an effluent standard for these sectors at 2,000 mg/L and allows a variance from this standard under certain conditions specific to the watershed in which the discharge is located. The rule applies only to new and expanding loads of TDS, not the existing loads, making it more easily achieved.

*Comment:* The proposed regulations will limit the availability of commercial treatment of brine. The proposed regulations will essentially eliminate much of the current capacity to take brines to municipal treatment plants for disposal.

*Response:* The Board does not agree. The final-form rulemaking will provide regulatory certainty. The Department met with over 60 manufacturers and vendors of technologies for treating the very high levels of TDS from the natural gas industry, specifically the Marcellus shale formation. While many of these vendors do not have actual facilities in operation and are seeking to get into the business, at least six manufacturers have either piloted the technology at full scale or have facilities currently operating in other states.

Much of the hesitancy on the part of these technology vendors is the uncertainty regarding this rule. The companies are reluctant to move forward without a clear direction in regulation concerning what levels they will need to treat to for TDS. Implementing this final-form regulation will provide certainty to the companies proposing treatment facilities and give a clear guidance on what their facility will need to treat to regarding high TDS wastewaters.

In addition, investment companies have indicated that without clear direction they are less willing to provide capital for financing these types of wastewater treatment facilities. One company provided information that their treatment plant, if built and operated, could create approximately 70 to 100 short-term jobs during construction and about 12 permanent jobs during operation of their facility.

Finally, these highly-concentrated TDS wastewaters pose a great threat to the biological treatment processes at municipal sewage treatment plants and the final-form rulemaking prohibits that without adequate pretreatment facilities.

*Comment:* Each treatment option leaves a residual waste product which required further disposal adding to

the cost of treatment for an issue that has not been identified as a Statewide or even prevalent concern. In addition, other environmental concerns associated with TDS reduction, such as energy consumption, air emissions, landfill capacity, and disposal costs have not been addressed.

*Response:* The Board appreciates this comment; however, based on the collective comments received determined that a sector-by-sector approach to controlling TDS is appropriate. High-TDS wastewaters from different industries present different treatment challenges. Not all industrial wastewaters containing TDS are consistent. Based on the need for regulation of a rapidly expanding industry which generates wastewaters with extraordinarily high levels of TDS and chlorides, the readily available proven treatment technologies for this wastewater, the low costs associated with treatment and the overwhelming public comment in favor of a standard for this industry, the final-form rulemaking focuses on treatment for oil and gas wastewaters. The final-form rulemaking now contains more specific treatment requirements for wastewater generated from all natural gas drilling activities.

New technologies are being developed that treat this wastewater without using large amounts of energy or emitting large quantities of air pollutants and the Board believes that this final-form rulemaking will continue to move that industry in that direction. In fact, the Board believes that the certainty provided by this rule will accelerate the development of more efficient treatment technologies, zero discharge technologies and also drive conservation and pollution prevention through reuse of the wastewater.

This industry will generate the residual solids as suggested. The Department continues to work with treatment technology providers to develop reusable end products from these materials to reduce waste and costs associated with this treatment.

*Comment:* The concerns of industry and environment are not mutually exclusive. Industry should be held to a high standard. Well run businesses know that it is much easier and less expensive to do job right first time, rather than clean up mistakes later.

*Response:* The Board appreciated these comments.

#### *Legal Comments*

These were comments regarding the legal concerns of the final-form rulemaking. For example, some stated that the Department failed to adequately consider statutory elements for rulemaking.

*Comment:* Environmental justice communities have been targeted for disposal of toxic wastewater. DELCORA had been permitted to receive, treat, and dispose of toxic wastewater into the Delaware River, even though the sewage treatment plant would not adequately treat the wastewater. Although the permit was rescinded due to community outrage, significant concern exists that it will happen in the future.

*Response:* DELCORA's permit to receive this wastewater was rescinded at the request of DELCORA. Regardless, all permit applications for treatment of this type of wastewater will be reviewed in accordance with existing Department regulations and, when effective, this final-form rulemaking. This final-form rulemaking requires adequate pretreatment of the natural gas wastewater to the specified standards.

*Comment:* The proposed rulemaking fails to adequately consider statutory elements, including the consideration of water quality management and pollution control in the watershed as a whole and the immediate and long-range economic impact upon the Commonwealth and its citizens.

*Response:* As stated in this preamble, this final-form rulemaking differs from the proposed rulemaking in several important respects. To provide greater clarity to the scope of the regulation, the final-form rulemaking specifically exempts certain classes of TDS discharges from the application of this final-form rulemaking. In addition, based on stakeholder comments received, the final-form rulemaking adopts a combination of recommended approaches for addressing these larger loadings of TDS. This combination of approaches includes an industrial sector-based regulation along with a watershed-based analysis. Since there are numerous industrial categories and subcategories that include TDS as a pollutant of concern in their wastewater discharges, the watershed-based approach for all industrial sectors other than oil and gas establishes an effluent standard, but also provide a variance option for these discharges. Further, the combination of these approaches does indeed consider the long-term economic impacts, as discussed throughout this preamble.

*Comment:* Definitions are overbroad and vague, and do not identify who is covered by the regulation and who is not.

*Response:* The Board agrees that the scope section should be revised. To provide greater clarity to the scope of the regulation, the final-form rulemaking specifically exempts certain classes of TDS discharges from the application of this rule. This approach is designed to clearly exclude from the scope of this regulation all existing loadings of TDS authorized by the Department prior to the effective date of this final-form rulemaking, as well as new and expanding TDS sources, which the Department has determined are insignificant from a loading perspective.

*Comment:* Chapter 95 should not replace Effluent Limitation Guidelines (ELGs) or Best Professional Judgment in the writing of permits.

*Response:* The final rulemaking does not do either. When ELGs exist, they are used to set effluent limitations. Best Professional Judgment is used by Department staff as a general rule in writing permits. The requirements of § 95.10 will be implemented in accordance with the framework established under § 92.2a (relating to treatment requirements).

*Comment:* DEP authority under state law is unclear or not clearly stated.

*Response:* The final-form rulemaking is adopted specifically under the authority of sections 5 and 402 of the act, which provide for the adoption of regulations implementing the purposes and requirements of the act and for the regulation of activities which create a danger of pollution to the waters of this Commonwealth, and section 1920-A of The Administrative Code of 1929, which authorizes the Board to promulgate rules and regulations necessary to implement the provisions of the act. In addition, section 304 of the act (35 P. S. § 691.304) authorizes the Department to adopt regulations necessary for the protection of the purity of the waters of this Commonwealth. Section 501 of the act (35 P. S. § 691.501) authorizes the protection of domestic water supplies. Notably, one of the fundamental policy objectives of the act, in section 4 (35 P. S. § 691.4) is "to prevent further pollution of the waters of the Commonwealth."

*Technical Comments*

These were comments regarding the technical aspects of the proposed rulemaking. Some were concerned with the perceived limited technical justification of the final-form rulemaking and others stated that the regulation does not offer a solution that addresses the problem.

*Comment:* The proposed rulemaking does not explain the problem nor does it offer a solution that addresses the problem. This proposed rulemaking has offered no scientific data or justification for imposing such severe limits. The proposed rulemaking is predicated on very limited sampling in the Monongahela River between October and December 2008 when river levels were at historical lows and there were high dissolved solids concentrations entering the Commonwealth from West Virginia.

*Response:* The Board disagrees with this comment. Neither the proposed rulemaking nor the final rulemaking is based on the conditions that are occurring in the Monongahela watershed. In the Monongahela, TDS levels have already exceeded water quality criteria. This means that allocations of TDS loads must be made for all dischargers in the watershed to bring the river back to compliance. The Department will be listing the Monongahela as impaired on its upcoming impaired waters list as required by the Federal Clean Water Act. The final-form rulemaking is intended to prevent other watersheds from becoming impaired, like the Monongahela.

The Board disagrees with the commentator's suggestions that the proposed rulemaking is not based on sufficient scientific data. The Department's analyses of watersheds across this Commonwealth were conducted using rigorous statistical methods. When the Department's analyses of WQN data showed the potential for water quality criteria violations, detailed studies were conducted in those watersheds.

The assessment process by the Department in the Beaver River watershed is the same as occurred in the Monongahela. The potential for a TDS problem has been identified from WQN data, and the Department is responding by collecting grab samples and deploying conductivity probes. It takes time to collect the data, but when an adequate number of samples become available, the Department will not simply rely upon a WQN frequency analysis, as suggested. It will consider the entire weight of evidence. Similar assessments of WQN data were made for the West and North Branches of the Susquehanna River, the Clarion River and Moshannon Creek, which were previously discussed.

A glaring omission by those who question the scientific need for the rule is any mention of the environmental disaster in Dunkard Creek that destroyed 26 miles of stream. The problem was high TDS concentrations leading to colonization and growth of golden algae, as well as osmotic pressure exceeding the regulatory numeric criterion. Dunkard Creek is a good example of what can happen if TDS is not controlled, and the loss of this important public resource was an environmental tragedy, documented by the loss of aquatic life, including endangered mussels.

*Comment:* The fact that the proposed rule focuses on a statewide limit, as opposed to being imposed on a watershed specific basis like other wastewater discharge requirements, will not result in an efficient use of resources.

*Response:* The Board agreed and revised its approach in the final-form rulemaking to include a watershed-by-watershed analysis as suggested, to more efficiently use its limited resources.

*Comment:* The health of aquatic organisms is protected by the current osmotic pressure water quality standard.

*Response:* The Board agrees to the extent that the effects of individual discharges on receiving streams are evaluated at the point of discharge; however, TDS is a conservative parameter, meaning that TDS is not subject to fate during transport in the water column. This means that a pound of TDS discharged in the headwaters of a watershed is still a pound of TDS at the mouth of the watershed. Osmotic pressure is not an effective measure of water quality from cumulative loadings of TDS from multiple discharges that can cause violations of water quality criteria at design conditions.

*Comment:* The number of NPDES permit applications should not be used as a basis for further regulation since these applications are speculative in nature.

*Response:* The Board disagrees and notes that the Department will treat these applications as authentic, each requesting a part of any available assimilative capacity, unless they are formally withdrawn.

*Comment:* The criteria for TDS, sulfates and chlorides are based on secondary maximum containment levels and are not a risk to human health.

*Response:* The Board does not necessarily agree with this suggestion. While TDS and sulfate concentrations manifest as secondary contaminants at the levels established as MCLs, they are toxic to both humans and aquatic life at higher concentrations. For example, sulfates begin to exhibit a laxative effect on humans at concentrations between 500 mg/L and 750 mg/L, while the secondary MCL is 250 mg/L.

*Administrative Comments*

These were comments regarding administrative aspects of the rulemaking, especially as it relates to the scope of the regulation. Many comments stated that the final-form rulemaking should be implemented immediately, some wanted elimination of the threshold for large sources, others wanted whole effluent toxicity requirements and others wanted regulation of the reuse of fracking wastewater.

*Comment:* Implement these proposed standards immediately. Do not postpone the effective date until 2011.

*Response:* The final-form rulemaking will become effective August 21, 2010.

*Comment:* The time frame of January 1, 2011 is an unrealistic goal for the implementation of this proposed rulemaking. The time required for design, permitting, ordering, construction, and final testing will not be possible sooner than 30-36 months.

*Response:* The Permitting Strategy for High-TDS Wastewaters (April 2009) establishes two dates-April 1, 2009, when the strategy became effective and January 1, 2011, when compliance with effluent standards was expected. In this final-form rulemaking, both the April 1, 2009, and January 1, 2011, have been changed to August 21, 2010. Prior to August 21, 2010, facilities are considered to be existing. After August 21, 2010, they will be new or expanding loads.

The final-form rulemaking only applies to new and expanding facilities, meaning facilities that will not have been constructed by August 21, 2010. These new facilities

literally will not be able to accept wastewater and discharge until they are constructed. Until these new facilities are constructed, wastewater can continue to be treated and disposed at existing facilities. There is currently no shortage of treatment capacity. Therefore, it appears that this argument is without merit.

*Comment:* The limits should be applicable to all treatment plants. New sources should be covered immediately, and existing sources of large TDS discharges should be covered through the NPDES renewal process.

*Response:* From the inception of the final-form rulemaking, the intent of the Board was to exempt existing discharges, and insignificant discharges, from the effluent standards aimed at controlling the new, larger source of TDS. The provisions specifically allow for continued discharges of TDS wastewaters at current loads and are designed to lessen the effects on existing and small discharges of TDS in this Commonwealth through the exemption and variance provisions.

*Comment:* Minimize impacts to existing operating facilities; including POTWs which receive trucked in wastewaters and septage, which often contains in excess of 2,000 mg/L.

*Response:* From the inception of the final-form rulemaking, the intent of the Board was to exempt existing discharges, and insignificant discharges, from the effluent standards aimed at controlling the new, larger source of TDS. The provisions specifically allow for continued discharges of TDS wastewaters at current loads and are designed to lessen the effects on existing and small discharges of TDS in this Commonwealth through the exemption and variance provisions.

*Comment:* The standards for TDS and the threshold concentration should be stated as daily maximum, not a monthly average.

*Response:* The Board does not agree with this suggestion. The 500 mg/L standard as a monthly average allows for effluent variability from treatment facility operations, and is more in line with the instream standard and MCL for TDS, which are both monthly averages.

*Comment:* There should be a minimum requirement that all discharges not cause background in-stream concentrations of TDS to rise above 133% of background levels (the Delaware River Basin Commission standard).

*Response:* The Board included this provision in the final-form rulemaking.

*Comment:* Due to the highly varying toxicity of both TDS discharges and especially Marcellus wastewater, Whole Effluent Toxicity (WET) testing should be required utilizing both an acute and chronic toxicity standard.

*Response:* If TDS are controlled to less than 500 mg/L, no WET is necessary.

*Comment:* Consideration should be given for the implementation of seasonal or flow-based TDS limits, with the intent of restricting TDS mass discharges during periods of low flow. Consideration should be given to the implementation of a TDS trading system, which could effectively address legacy TDS contributors in return for higher discharge limits for municipalities and industry.

*Response:* Real-time management is discussed in great detail in this preamble. Support for this position relies on a certain rationale that does not reflect real-world considerations or good science. This method of managing flows

on a real-time basis presents many problems, most notably compliance with Federal and State regulatory water quality standards.

*Comment:* The regulation penalizes water reuse and recycling. Reduction in water use will result in a higher concentration for the same mass loading. Change “2000 mg/L or 100,000 lbs/day” to “100,000 lbs/day and 2000 mg/L” in applicability criteria.

*Response:* The final-form rulemaking promotes reuse of natural gas industry wastewater. The final-form rulemaking no longer defines high-TDS wastewater in the manner cited in this comment.

*Comment:* Sampling done by DEP and posted on the SWRO web site used an inappropriate testing method, drying the samples at 105 Deg, rather than at 180, which is required by EPA and USGS test methods, which could result in higher TDS concentrations due to the inclusion of water in the results.

*Response:* This comment is not accurate. Both laboratory methods are correct. In fact, the method used by the Department may be “more correct” in measuring “total” dissolved solids, as it measures both the organic and inorganic components of the TDS.

*Comment:* Since changes are inevitable, you should republish as proposed or advanced notice of final rulemaking.

*Response:* The Board did not publish an advanced notice of final rule making. Issuing an advanced notice of final rulemaking is discretionary and, given the extensive public outreach for this regulation, including the cooperative work by the Department with the TDS Stakeholders Subcommittee, and the fact that the final-form rulemaking incorporates many of the recommendations of the stakeholders, the Board does not believe an advanced notice of final rulemaking will result in additional value, but rather would only lead to unnecessary delay.

*Comment:* Consider separate standards for estuaries and other high naturally-occurring TDS waters.

*Response:* The watershed-based approach contained in the final-form rulemaking accomplishes this.

#### G. Benefits, Costs and Compliance

##### Benefits

Promulgation and implementation of this final-form rulemaking will assure that watersheds in this Commonwealth will not exceed 500 mg/L of TDS in stream, protecting aquatic life and drinking water. This added level of protection will prevent impairment of watersheds and prevent existing and new dischargers of TDS from having to make large investment in treatment technologies resulting from Federally-mandated TMDL allocations.

This final-form rulemaking exempts many small dischargers that are not a part of the projected problem, such as sewage treatment plants, abandoned mine discharge treatment plants, surface mining, small food processors, and the like. The final-form rulemaking allows these existing dischargers to continue operating under current scenarios.

The final-form rulemaking addresses the overwhelming public comments in support of a 500 mg/L standard for the oil and gas industry. The final-form rulemaking focuses more precisely on the specific pollution prevention problem that needs to be addressed so that the regulatory requirement is reasonable.

The final-form rulemaking is consistent with the Federal approach by separating industry sectors and requirements for “new” versus “existing” sources. It also assures the public that the Marcellus Industry in this Commonwealth will not harm streams. It accomplishes this through requiring treatment, promoting the reuse of flowback and production waters, driving methods of treatment and disposal that do not involve stream discharge and encouraging treatment technology expansion and development for future sources of high TDS, in turn creating new jobs for residents in this Commonwealth.

Finally, it employs the approach preferred by most members of industry. The final-form rulemaking addresses the difficulty from setting an end-of-pipe effluent limitation applicable to numerous industry sectors because of differences in feasible technology and costs across industries affected. This final-form rulemaking is fair to existing operations and industries.

#### *Compliance Costs*

The final-form rulemaking could present new costs for treatment if an existing industrial facility wishes to expand, or a new industry wishes to start, and is unable to obtain a variance.

The final-form rulemaking will present treatment costs to the oil and gas industry, which may be minimized through recycling and reuse, zero discharge treatment technologies or underground injection options. However, this industry should be very capable of absorbing these costs as minimal when compared to the expected revenues from the Marcellus shale formation in this Commonwealth.

#### *Compliance Assistance Plan*

The Department will provide written notification of the changes to the industrial categories that may be affected.

#### *Paperwork Requirements*

There are no paperwork requirements imposed by this final-form rulemaking.

#### *H. Pollution Prevention*

The matters affected by this final-form rulemaking promote pollution prevention and control.

#### *I. Sunset Review*

This final-form rulemaking will be reviewed in accordance with the sunset review schedule published by the Department to determine whether the final-form rulemaking effectively fulfills the goals for which it was intended.

#### *J. Regulatory Review*

Under section 5(a) of the Regulatory Review Act (71 P. S. § 745.5(a)), on October 28, 2009, the Department submitted a copy of the notice of proposed rulemaking, published at 39 Pa.B. 6467, to IRRC and the Chairpersons of the Senate and House Environmental Resources and Energy Committees (Committee) for review and comment.

Under section 5(c) of the Regulatory Review Act, IRRC and the Committees were provided with copies of the comments received during the public comment period, as well as other documents when requested. In preparing the final-form rulemaking, the Department has considered all comments from IRRC, the Committees and the public.

Under section 5.1(j.2) of the Regulatory Review Act (71 P. S. § 745.5a(j.2)), on June 8, 2010, the Senate Commit-

tee notified IRRC of its intent to review the final-form rulemaking. Under section 5.1(j.2) of the Regulatory Review Act, on July 2, 2010, after the conclusion of the additional review period requested, the final-form rulemaking was deemed approved by the Senate Committee. Under section 5.1(j.2) of the Regulatory Review Act, on June 16, 2010, this final-form rulemaking was deemed approved by the House Committee. Under section 5.1(e) of the Regulatory Review Act, IRRC met on June 17, 2010, and approved the final-form rulemaking.

#### *K. Findings*

The Board finds that:

(1) Public notice of proposed rulemaking was given under sections 201 and 202 of the act of July 31, 1968 (P. L. 769, No. 240) (45 P. S. §§ 1201 and 1202) and regulations promulgated thereunder, 1 Pa. Code §§ 7.1 and 7.2.

(2) A public comment period was provided as required by law and all comments were considered.

(3) The regulations do not enlarge the purpose of the proposed rulemaking published at 39 Pa.B. 6467 with a correction published at 39 Pa.B. 6547.

(4) These regulations are necessary and appropriate for administration and enforcement of the authorizing acts identified in Section C.

#### *L. Order*

The Board, acting under the authorizing statutes, orders that:

(a) The regulations of the Department, 25 Pa. Code Chapter 95, are amended by amending § 95.2 and by adding § 95.10 to read as set forth in Annex A.

(b) The Chairperson of the Board shall submit this order and Annex A to the Office of General Counsel and the Office of Attorney General for review and approval as to legality and form, as required by law.

(c) The Chairperson of the Board shall submit this order and Annex A to IRRC and the Committees as required by the Regulatory Review Act.

(d) The Chairperson of the Board shall certify this order and Annex A and deposit them with the Legislative Reference Bureau, as required by law.

(e) This order shall take effect upon publication in the *Pennsylvania Bulletin*.

JOHN HANGER,  
Chairperson

(*Editor's Note:* For the text of the order of the Independent Regulatory Review Commission relating to this document, see 40 Pa.B. 3753 (July 3, 2010).)

**Fiscal Note:** Fiscal Note 7-446 remains valid for the final adoption of the subject regulations.

#### **Annex A**

### **TITLE 25. ENVIRONMENTAL PROTECTION PART I. DEPARTMENT OF ENVIRONMENTAL PROTECTION**

#### **Subpart C. PROTECTION OF NATURAL RESOURCES**

#### **ARTICLE II. WATER RESOURCES**

#### **CHAPTER 95. WASTEWATER TREATMENT REQUIREMENTS**

#### **§ 95.2. Effluent standards for industrial wastes.**

Industrial wastes must meet the following effluent standards:

(1) Wastes must have a pH of not less than 6 and not greater than 9, except where:

(i) The wastes are discharged to an acid stream, in which case the pH may be greater than 9.

(ii) The discharger affirmatively demonstrates, in writing, to the Department that biological respiration in the wastewater treatment system will cause the discharge to exceed the limits in this paragraph and that exceeding these limits will not result in a violation of applicable water quality standards or of the applicable treatment requirements and effluent limitations to which a discharge is subject under the Federal Act, in which case the Department may grant a variance, in writing, from the limitation set forth in this paragraph.

(2) Oil-bearing wastewaters, except those subject to paragraph (3), must comply with the following:

(i) At no time cause a film or sheen upon or discoloration of the waters of this Commonwealth or adjoining shoreline.

(ii) At no time contain more than 15 milligrams of oil per liter as a daily average value nor more than 30 milligrams of oil per liter at any time, or whatever lesser amount the Department may specify for a given discharge or type of discharge as being necessary for the proper protection of the public interest or to meet any requirements based upon the State Act or the Federal Act, as defined in § 92.1 (relating to definitions).

(3) Petroleum marketing terminals must:

(i) Be provided with facilities to remove oil from waters, including stormwater runoff, before discharge into waters of this Commonwealth. Compliance with this paragraph constitutes compliance with paragraph (2)(i) except to the extent that the State Act or Federal Act or regulations promulgated thereunder impose a more stringent requirement.

(ii) Develop, implement and keep up to date pollution incident prevention plans as described in § 91.34 (relating to activities utilizing pollutants).

(iii) Design, maintain and utilize oil removal facilities that consist of an American Petroleum Institute (A.P.I.) listed oil separator, unless the person operating the facility can demonstrate to the Department that an alternate design is equivalent or better in removing oil from water to maintain and protect the waters of this Commonwealth, including all existing and designated uses established under Chapter 93 (relating to water quality standards).

(4) Waste may not contain more than 7 milligrams per liter of dissolved iron.

(5) When surface waters are used in the industrial plant, the quality of the effluent need not exceed the quality of the raw water supply if the source or supply would normally drain to the point of effluent discharge, unless otherwise required under the act or Federal Act or regulations promulgated thereunder.

**§ 95.10. Treatment requirements for new and expanding mass loadings of Total Dissolved Solids (TDS).**

(a) The following are not considered new and expanding mass loadings of TDS and are exempt from the treatment requirements in this section:

(1) Maximum daily discharge loads of TDS or specific conductivity levels that were authorized by the Depart-

ment prior to August 21, 2010. These discharge loads will be considered existing mass loadings by the Department.

(i) Relocation or combination of existing discharge points of existing mass loadings of TDS do not constitute a new or expanding mass loading unless total mass loadings are increased.

(ii) Existing publicly owned treatment works (POTW) as defined in § 92.1 (relating to definitions) and industrial waste treatment facilities authorized prior to August 21, 2010, under permits authorizing the acceptance, treatment and discharge of TDS do not constitute a new or expanding mass loading unless total mass loadings accepted, treated and discharged are to be increased. Only the net increase in TDS mass loadings from these facilities will be considered a new and expanding mass loading of TDS.

(2) Facilities treating postmining pollutional discharges from abandoned mine sites. For purposes of this section, abandoned mine sites include all lands and water eligible for reclamation or drainage abatement or treatment expenditures under section 402(g)(4) or section 404 of the Surface Mining Control and Reclamation Act of 1977 (30 U.S.C.A. §§ 1232(g)(4) and 1234).

(3) Surface mining activities with preexisting discharges subject to Chapter 87, Subchapter F or Chapter 88, Subchapter G (relating to surface coal mines: minimum requirements for remining areas with pollutional discharges; and anthracite surface mining activities and anthracite bank removal and reclamation activities: minimum requirements for remining areas with pollutional discharges) and preexisting discharges subject to Chapter 90, Subchapter F (relating to coal refuse disposal activities on areas with preexisting pollutional discharges).

(4) Discharges from active surface coal mining operations with an open pit dimension of less than 450,000 square feet exposed at any time.

(5) Discharges from erosion and sediment control facilities used at surface mining activities as defined in § 86.1 (relating to definitions).

(6) Existing mine drainage directed to a mine pool where the mine pool is being treated in accordance with applicable requirements in Chapters 91—96.

(7) New and expanding discharge loadings of TDS equal to or less than 5,000 pounds per day, measured as an average daily discharge over the course of a calendar year, otherwise known as the annual average daily load.

(8) Discharges of wastewater produced from industrial subcategories with applicable effluent limit guidelines for TDS, chlorides or sulfates established as best available technology economically achievable (BAT), best conventional pollutant control technology (BCT) or new source standards of performance, by the administrator of the EPA under sections 303(b) and 306 of the Federal Act (33 U.S.C.A. §§ 1314(b) and 1316).

(b) Operations with wastewater resulting from fracturing, production, field exploration, drilling or completion of natural gas wells shall comply with the following requirements:

(1) Except as provided in paragraph (3), there may be no discharge of wastewater into waters of this Commonwealth from any source associated with fracturing, production, field exploration, drilling or well completion of natural gas wells.

(2) A wastewater source reduction strategy shall be developed by the well operator by August 22, 2011, and

submitted to the Department upon request. The source reduction strategy must identify the methods and procedures the operator shall use to maximize the recycling and reuse of flow back or production fluid either to fracture other natural gas wells, or for other beneficial uses approved under Chapter 287 (relating to residual waste management—general provisions). The strategy shall be updated annually and include, at a minimum, the following information:

(i) A complete characterization of the operator's wastewater stream including chemical analyses, TDS concentrations and monthly generation rate of flowback and production fluid at each natural gas well.

(ii) A description and evaluation of potential wastewater source reduction options through recycling, reuse or other beneficial uses.

(iii) The rationale for selecting the source reduction methods to be employed by the operator.

(iv) Quantification of the flowback and production fluid generated by each well which is recycled or reused either to fracture other natural gas wells or for other approved beneficial uses.

(3) New and expanding treated discharges of wastewater resulting from fracturing, production, field exploration, drilling or well completion of natural gas wells may be authorized by the Department under Chapter 92 (relating to National Pollutant Discharge Elimination System permitting, monitoring and compliance) provided that the following requirements are met:

(i) Discharges may be authorized only from centralized waste treatment facilities (CWT), as defined in 40 CFR 437.2(c) (relating to general definitions).

(ii) Discharges may not be authorized from a POTW, as defined in § 92.1, unless treatment at a CWT meeting all of the requirements of this chapter precedes treatment by the POTW.

(iii) The discharge may not contain more than 500 mg/L of TDS as a monthly average.

(iv) The discharge may not contain more than 250 mg/L of total chlorides as a monthly average.

(v) The discharge may not contain more than 10 mg/L of total barium as a monthly average.

(vi) The discharge may not contain more than 10 mg/L of total strontium as a monthly average.

(vii) The discharge complies with the performance standards in 40 CFR 437.45(b) (relating to new source performance standards (NSPS)).

(4) Deep well injection of wastewater resulting from fracturing, production, field exploration, drilling or well completion of natural gas wells shall comply with § 78.18 (relating to disposal and enhanced recovery well permits).

(c) New and expanding mass loadings of TDS not addressed in subsections (a) and (b) may not contain more than 2,000 mg/L of TDS as a monthly average, unless a variance is approved by the Department under this section. For purposes of this subsection, any net increase in existing TDS loadings authorized after August 21, 2010, will be considered a new and expanding mass loading of TDS.

(d) A request for a variance to subsection (c) shall be submitted to the Department and be accompanied by the following information:

(1) An analysis of the applicant's existing discharge loads of TDS, and the projected new discharge loads associated with the proposed new and expanding mass loadings of TDS.

(2) An analysis of the applicant's existing treatment facilities and the ability of those facilities to meet the requirement in subsection (c).

(3) An analysis of upgrades necessary to bring the applicant's existing facility into compliance with subsection (c) and the estimated costs associated with the upgrades.

(4) An analysis of the receiving stream's water quality for TDS at, or upstream from, the proposed point of discharge.

(e) A request for a variance to subsection (c) will be subject to the public notice requirements for permit applications in § 92.61 (relating to public notice of permit application and public hearing).

(f) A variance to subsection (c) may be approved by the Department only under the following conditions:

(1) A watershed analysis conducted by the Department determines that a variance will not result in a reduction of available assimilative capacity for TDS to less than 25% of the total available assimilative capacity at the next downstream point of water quality standards compliance. Available assimilative capacity will be calculated using design flow conditions under § 96.4(g) (relating to TMDLs and WQBELs).

(2) The resulting instream concentration of TDS at the point of discharge from the new or expanding loading will not violate water quality standards in Chapter 93 (relating to water quality standards).

(g) Coal-fired electric steam generating units subject to effluent limitations in 40 CFR Part 423 (relating to steam electric power generating point source category), including TDS effluent limitations created by the EPA rule-making on effluent limitations scheduled for completion by March 2014 (Docket No. EPA-HQ-OW-2009-0819), must comply with subsection (c) by December 31, 2018, unless exempted by subsection (a).

[Pa.B. Doc. No. 10-1572. Filed for public inspection August 20, 2010, 9:00 a.m.]