

**Report to Environmental Quality Board**  
**Comment and Response Document**  
**Triennial Review of Water Quality Standards**

**Amendments to 25 Pa Code Chapters 93**

April 2013

The regulation, which comprise the Commonwealth's triennial review of water quality standards, was adopted by the Environmental Quality Board (Board) as proposed rulemaking at its April 17, 2012 meeting, and was published in the *Pennsylvania Bulletin* on July 7, 2012 (42 Pa.B. 4367), with provision for a 45-day public comment period that ended August 21, 2012. The Board, held a public hearing for the purpose of accepting comments on the proposed rulemaking on August 8, 2012 in Conference Room 105, Rachel Carson State Office Building, 400 Market Street, Harrisburg, PA. The Board received public comments from 197 commentators, including testimony from two witnesses at the public hearing, and comments from the Independent Regulatory Review Commission (IRRC).

The Board has considered all of the public comments received on the proposed rulemaking in preparing the final regulation. The Water Resources Advisory Committee (WRAC), in coordination with the Department, initiated an Ad hoc workgroup to discuss two aspects of the triennial review proposed rulemaking for revisions to Chapter 93, Water Quality Standards. The Ad hoc workgroup met on August 27, 2012 to discuss the proposed sulfate aquatic life criterion, and again on August 29, 2012, to allow for scientific information to be presented on the aquatic life and human health criterion for molybdenum. These publicly noticed Ad hoc workgroup meetings were held in Room 105, Rachel Carson State Office Building, 400 Market Street, Harrisburg, PA, and offered presenters the opportunity to participate by conference call, as well.

The following are the Department's responses to the public comments received on the proposed rulemaking for the triennial review (TR13):

**Chapter 93 Comments**

***General Comments***

**1.) Comment:** We recognize the value of clean water and support PA DEP in its efforts to provide protection to preserve the integrity of existing and designated uses of surface waters in the Commonwealth. But these protections must have a sound scientific basis, and be demonstrated through valid chemical and biological testing and analyses. **(17)**

**Response:** The Department agrees. Thank you for your comment.

**2.) Comment:** Subject to a few comments listed, EPA is fully supportive of Pennsylvania's proposed revisions. **(22)**

We recognize that human health criteria are important aspects of water quality criteria that help protect anglers and boaters as well as the general public. We defer to DEP staff and their coordination with the US EPA to evaluate human health risks and establish human health criteria for these constituents. **(7)**

The Department has provided sound science regarding color. The Commonwealth is required to ensure water quality for all Pennsylvanians and reviewing sound science and revising the criteria is warranted. **(10)**

**Response:** Thank you for your comments.

**3.) Comment:** The commentator urged the EQB to consider updating its state-wide aquatic life criteria for copper to use the BLM (Biotic Ligand Model) as currently recommended by EPA. **(5)**

**Response:** At this time, the Department is not considering revisions to the statewide aquatic life criterion for copper. The BLM method as currently recommended by EPA can be used, and is generally the preferred method for developing site-specific criteria for copper where appropriate to Pennsylvania waters.

**4.) Comment:** We believe that the Pennsylvania Department of Environmental Protection (DEP) should support its position with data from the Commonwealth by exercising good science rather than applying standards created by another state based on its own unique geology and geochemistry. **(18)**

**Response:** PA utilizes all its available resources in the development of water quality criteria.

**5.) Comment:** We request that consideration be given to evaluating whether standards for both methane and ethane might be developed. We are supportive of all provisions in the rulemaking along with the additional considerations for both methane and ethane. **(10, 15)**

**Response:** At this time, the Department is not working on criteria for methane and ethane. The Department evaluates the need of such criteria as requested by our permitting staff, based on discharge analysis. If the need for criteria for these compounds is justified, the Board will propose statewide criteria during a future rulemaking.

**6.) Comment:** Whether the regulation is supported by acceptable data; Protection of the public health, safety and welfare and the effect on the Commonwealth's natural resources: If data is basis for a regulation, promulgating agencies are required to provide a description of the data, explain in detail how the data was obtained, and how it meets the acceptability standard for empirical, replicable and testable data that is supported by Section 5(a)(14) of the RRA (71 P.S. § 745.5(a)(14) and Question #11 of the RAF. We appreciate the time and effort spent by the Board in preparing the seven rationale documents submitted as part of this regulatory package. **(197)**

**Response:** Please see the attached rationale documents for specific literature reviews and citations used to support this rulemaking.

Some studies were reviewed, but not used because they were determined to be incomplete for use in calculating the corresponding criteria. More detail is provided within the parameter-specific responses.

**7.) Comment:** The House and Senate Environmental Resources Committees (“Legislative Standing Committees”) and other legislators, as well as some members of the regulated community, have questioned various aspects of the data used by the Board to support this rulemaking. Most of the concerns relate to the standards being established for chloride, sulfate and molybdenum. Some commentators expressed concerns with the standards being established for resorcinol, strontium and 1,4-dioxane. Those that raised concerns explained why they believe that the data relied upon by the Board is not acceptable and, in some instances, provided their own studies and research in support of their positions. (197)

**Response:** Please see pages 15-20 (chloride); 22-27 (sulfate); 29-31 (1, 4-dioxane); 32-38 and 40-42 (molybdenum); 38 and 43 (resorcinol); 38-39 (strontium) for detailed responses to the parameters mentioned in this comment. Comprehensive data searches and reviews are undertaken during the development of all water quality criteria to identify applicable studies. In order for data to be useable in the development of water quality criteria, it must meet the specific requirements established in the EPA’s Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (EPA-822-B-00-004, October 2000.) As outlined in 25 Pa. Code §16.32(d)(1-4), studies must have been peer-reviewed in order to be considered as a source of relevant risk assessment values. Those studies that have not been peer-reviewed, and subsequently published in a scientific journal, are not considered. During the Department’s review and selection process, studies are eliminated for a variety of reasons. Some studies are eliminated because they either are determined to have incomplete toxicity data or did not evaluate the appropriate critical endpoints for use in calculating the corresponding criteria. While a single study may serve to provide a critical piece of information necessary to calculate a criterion, multiple to numerous studies are evaluated and considered in the overall development of each criterion.

**8.) Comment:** Other members of the regulated community, including the PA Fish and Boat Commission, believe that the standards being proposed for chloride and molybdenum should be strengthened to provide greater protection of the Commonwealth’s water. (197)

**Response:** The Department appreciates the comment, and will continue to evaluate these criteria.

**9.) Comment:** As the final-form rulemaking is being developed, we encourage the Board to work closely with the regulated community, including DEP’s Water Resources Advisory Committee, to build a consensus on what data is appropriate and acceptable. We ask the Board to explain why the data used is appropriate, compared to the data and contentions raised by each of the commentators. (197)

**Response:** The Water Resources Advisory Committee (WRAC) was briefed on the scope of the regulation at the July 14, 2010 meeting, and provided on-going updates on the review and regulatory development at the April 13, June 15, July 13, October 13, and December 16, 2011 meetings, three of which were special meetings dedicated to the triennial review. WRAC was also provided a draft of the proposed regulatory amendments prior to the December 2011 meeting, so they could consider the amendments and make recommendations at the January 11, 2012 meeting.

On January 11, 2012, the Department's Water Resources Advisory Committee (WRAC) voted to present this rulemaking package to the Board. In addition, the Department provided to the Agricultural Advisory Board (AAB) on August 17, 2011 a regulatory agenda that included the triennial review of water quality standards, but the AAB declined the need for their consideration at their regularly scheduled October 19, 2011 meeting.

The public was afforded the opportunity to comment on this proposal during a public comment period, which also provided for public hearings. Following closure of the public comment period, WRAC, in coordination with the Department, initiated an Ad hoc workgroup to discuss two aspects of the triennial review proposed rulemaking for revisions to Chapter 93, Water Quality Standards. An Ad hoc workgroup met on August 27, 2012 to discuss the proposed sulfate aquatic life criterion, and again on August 29, 2012, to allow for scientific information to be presented on the aquatic life and human health criterion for molybdenum. These Ad hoc workgroup meetings were held in Room 105, Rachel Carson State Office Building, 400 Market Street, Harrisburg, PA, and offered presenters the opportunity to participate by conference call, as well.

**10.) Comment:** Need for the Regulation: Commentators, including the Legislative Standing Committees and other legislators, have questioned the need for the new standards. They note that there is no federal mandate to impose these standards and that the Board has not adequately explained the environmental need for the standards. They also note that existing regulations, including 25 Pa. Code § 95.10, relating to treatment requirements for new and expanding mass loadings of total dissolved solids, and the osmotic pressure parameter found in table 3 of § 93.7, relating to specific water quality criteria, adequately protect the environment from any potential harms from sulfate and chloride. Regarding molybdenum, it is noted that no statewide problem has been documented or identified. (197)

**Response:** Please see pages 15-20 (chloride); 22-27 (sulfate); and 32-38 and 40-42 (molybdenum) for detailed responses to the parameters mentioned in this comment. Also, please see response to Comment 11 for a detailed discussion on the need for new standards. Section 303(c)(1) of the federal Clean Water Act and 40 CFR 131.20 of the federal regulations require that states review their water quality standards and modify them, as appropriate, at least once every three years. This regulation fulfills this requirement for Pennsylvania's triennial review of water quality standards. This requirement is based upon recognition that the science of water quality is constantly advancing. Its purpose is to ensure that standards are based on current science, methodologies, and US EPA mandates, recommendations and guidance. The federal mandate for states to develop water quality criteria is found at section 303(c)(2)(A) of the Clean Water Act (CWA). When states develop standards, they are required to designate uses of the waters involved and the water quality criteria to protect those uses. The federal Clean Water Act requires the following factors to be taken into consideration:

“Such standards shall be such as to protect the public health or welfare, enhance the quality of the water and serve the purposes of this Chapter. Such standards shall be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes, and also taking into consideration their use and value in navigation.” 33 U.S.C.A. §1313(c)(2)(A).

Under federal law, maintaining surface water quality standards are primarily a state responsibility. EPA provides oversight and guidance and approves state standards for surface water, but does not promulgate standards that apply nationwide. Where a state's standards are inadequate, EPA will promulgate standards for the state. Besides developing criteria that protect designated uses, the criteria "must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use." 40 CFR §131.11.

**11.) Comment:** We agree that the Board has not demonstrated the need for the new standards. If the new standards are retained in the final-form rulemaking, we ask the Board to provide a more detailed explanation of why the new standards are needed and why the benefits of the new standards outweigh the costs to the regulated community. (197)

**Response:** The purpose of developing the water quality standards, as proposed, is to protect and maintain Pennsylvania's surface waters. Pennsylvania's surface waters, through the water quality standards program, are protected for a variety of uses—drinking water supplies for humans, livestock and wildlife; fish consumption; irrigation for crops; aquatic life uses; recreation; industrial water supplies and special protection. This proposed action is necessary to protect and preserve the water resources from the threat of toxic substances. Overall, the citizens of this Commonwealth will benefit from the regulation since it will provide the appropriate level of water quality protection for all water uses.

Any reduction in the total toxic load in Pennsylvania waterbodies is likely to have a positive effect on the human health of Pennsylvanians. This will translate into an as yet unknown economic benefit through avoided cleanup costs later in time as well as avoided costs for the treatment and caring for persons with illnesses and disabilities that can be reasonably attributed to environmental contaminants in surface water.

Reduced toxics in Pennsylvania's waterways will likely increase recreational fishing and tourism to swimming and fishing locations throughout the state. Additionally, cleaner rivers and fish may lead to increased birding and wildlife viewing opportunities, as the benefits of cleaner fish work themselves up the food chain, resulting in substantial economic benefits. Persons who recreate on the waters and who fish, both for sport and consumption, will benefit from better water quality protection.

A reduction in toxics found in Pennsylvania's waterways may lead to increased property values for properties located near rivers or lakes. A 2006 study from the Great Lakes region estimated that property values were significantly depressed in two regions associated with toxic contaminants (PAHs, PCBs, and heavy metals). The study showed that a portion of the Buffalo River region (approx. 6 miles long) had depressed property values of between \$83 million and \$118 million for single-family homes, and between \$57 million and \$80 million for multi-family homes as a result of toxic sediments. The same study estimated that a portion of the Sheboygan River (approx. 14 miles long) had depressed property values of between \$80 million and \$120 million as the result of toxics. "*Economic Benefits of Sediment Remediation*," <http://www.nemw.org/Econ> (last accessed January 14, 2013). While this study related to the economic effect of contaminated sediment, the idea that toxic pollution depresses property values is easily transferable to Pennsylvania. A reduction in toxic pollution in Pennsylvania's waters may have a substantial economic benefit to property values in close proximity to waterways.

There are economic benefits to be gained by maintaining clean water for potable water supply use. Water suppliers, and their customers, may benefit from lower pretreatment costs if water is withdrawn that meets the surface water quality standards. Assuring the availability of clean water will cut down on the costs to consumers for purchasing household pretreatment/water filtration systems and bottled water. See *"The Real Costs of Bottled Water,"* San Francisco Chronicle, Feb. 18th, 2007, < <http://www.sfgate.com/green/article> (last accessed November 15, 2012) which estimates the cost of bottled water to be anywhere between 240 and 10,000 times more expensive than tap water. An additional benefit to greater reliance on tap water is the reduction of containers that need to be recycled or disposed of in landfills. Persons may incur a cost benefit by reducing their dependence on bottled waters and household water filtration systems based on their confidence in source water quality.

By controlling toxics at the point of discharge, users downstream will not have to bear the costs associated with cleaning up someone else's discharge before the water can be used. For example, fewer toxics in surface waters may reduce costs incurred by downstream surface water users who have to pre-treat water for industrial or commercial use (i.e. food processors). Also, reductions at the point of discharge reduce the costs for water suppliers who will have to treat water that is high in toxics at their intakes to meet drinking water standards. Passing on the treatment to water suppliers will increase costs to drinking water customers. Any intervening water uses such as irrigation and fish consumption, between the point of discharge and the point of use, will be protected by limiting the amount of toxics that may be discharged. Under these scenarios, multiple surface water users will benefit—industrial, agricultural, commercial, and potable water users.

There are also economic benefits to be gained by having clearly defined remediation standards for surface waters. Under Pennsylvania's Land Recycling and Environmental Remediation Standards Act, liability relief is available, by operation of law, if a person demonstrates compliance with the environmental remediation standards established by the law. Surface water quality criteria are used to develop remediation standards under the law. Persons performing remediation depend upon these criteria to obtain a liability relief benefit under the law. An article in the Duquesne University Law Review discusses the importance of liability limitation as "vital to the participation in the remediation process." The article recognizes that "liability protection provides the missing ingredient—financial incentive—for undertaking the cleanup of an industrial site." See *"COMMENT: Pennsylvania's Land Recycling Program: Solving the Brownfields Problem with Remediation Standards and Limited Liability,"* Creenan, James W. and Lewis, John Q., Duquesne University Law Review, 34 *Duq. L. Rev.* 661 (Spring 1996). Industrial land redevelopers will benefit from these regulations by having financial certainty when choosing a surface water cleanup standard and by being eligible for liability relief under state law.

**12.) Comment:** Direct and indirect cost to the Commonwealth, political subdivision and private sector: Adverse effects on process, productivity or competition: Commentators, along with the Legislative Standing Committees and other legislators, have raised concerns with the cost imposed by the new standards and have questioned the correlating benefit to the environment and human health. Included in those concerns is the fiscal impact that the new chloride standard will have on existing conventional oil and gas operations in the Commonwealth. The commentators contend that the chloride standard for discharges will render many existing oil and gas treatment and discharge systems unusable and that this will add to the abandoned well problem in PA.

We asked the Board to provide more detailed information about the fiscal impact of the rulemaking. We encourage the Board to work with the regulated community to compute an accurate estimate of the cost associated with implementing this rulemaking. We will use that information to determine if this rulemaking satisfies the economic or fiscal impact criterion of the RRA. (197)

**Response:** The Department is recommending the Board withdraw the proposed equation-based (both the acute and chronic equations) aquatic life criteria for chloride. In accordance with the federal Clean Water Act, the Department is not to consider the cost of compliance when developing water quality criteria. They are strictly based on science. For more information, please see the response to Comment #20. As for implementation of these criteria, please consider the following:

Where a water quality standard exists for a pollutant, and in the Department's judgment the discharge of such pollutant from a point source will be at a concentration that has the reasonable potential to exceed that standard, the Department is required to establish monitoring requirements and/or water quality-based effluent limitations for the pollutant in an NPDES permit. These effluent limitations are calculated based on the water quality criteria. However, there are factors that may be considered by the Department under the Clean Water Act that may result in the modification of such effluent limitations or the deadline by which compliance with limitations must be achieved. Based on site-specific evaluations and economic considerations, effluent limitations developed based on new water quality criteria may be modified, or more time for compliance may be granted under applicable regulations.

Accurate costs and savings, however, cannot be determined at the time of criteria development since such cost analysis is based on site-specific considerations that must be evaluated on a case-by-case basis. The chloride standard has been removed on final rulemaking.

**13.) Comment:** Feasibility: Reasonableness: Implementation procedures: Commentators have raised concerns with the feasibility of complying with the rulemaking. They believe it is unreasonable to expect compliance when the necessary technology to comply with the regulation may not be readily available and they ask the Board to explain how DEP will implement the regulation and how the regulated community can comply with all aspects of it. For example:

1. Can water be tested for the presence of 1,4-dioxane?
2. Does the technology exist to treat water discharges to a level that would be in compliance with the rulemaking?
3. Are the test methodologies approved by DEP's Laboratory Accreditation Program appropriate for all of the substances listed in the rulemaking? (197)

**Response:** DEP's Laboratory Accreditation Program agrees that the test methodologies identified in Chapter 16 are appropriate for all of the substances listed in this rulemaking. The Department has identified that test methodologies are available for all new or revised criteria being proposed in this rulemaking, and are being incorporated into the Table 2A and 2B in Chapter 16, Appendix A.

In response to the example, there are approved laboratory methods available for the analyses of 1,4-dioxane, and the Department is incorporating these analytical methods into Table 2B (relating to organics) in Chapter 16, Appendix A. Several of these methods are capable of detecting 1,4-dioxane

at levels below that of the proposed criterion. There are also treatment technologies available for 1,4-dioxane (See EPA. Dec 2006. EPA-542-R-06-009).

### ***General Comments of Economic Impacts***

**14.) Comment:** According to the Board, this rulemaking is being promulgated, in part, under Sections 5(b)(1) and 402 of the Clean Streams Law (Law) (35 P.S. §§691.402). While we do not question the Board's authority under these provisions, we do question whether the regulation is consistent with Section 5(a) of the Law (35 P.S. §691.5(a)). That section of the Law requires the following factors to be considered, where applicable, when adopting rules and regulations:

1. Water quality management and pollution control in the watershed as a whole;
2. The present and possible future uses of particular waters;
3. The feasibility of combined or joint treatment facilities;
4. The state scientific and technological knowledge; and
5. **The immediate and long-range economic impact upon the Commonwealth and its citizens.**

We question whether proper consideration was given to the fifth criterion of Section 5(a). **(197)**

We question whether the regulation is consistent with Section 5(a) of the Clean Streams Law. **(21)**

**Response:** Please see the response to Comment #20 for more detail. In accordance with the federal Clean Water Act, the Department is not to consider the cost of compliance when developing water quality criteria. The criteria are strictly based on science. As for implementation of these criteria, please consider the following: Where a water quality standard exists for a pollutant, and in the Department's judgment the discharge of such pollutant from a point source will be at a concentration that has the reasonable potential to exceed that standard, the Department is required to establish monitoring requirements and/or water quality-based effluent limitations for the pollutant in an NPDES permit. These effluent limitations are calculated based on the water quality criteria. However, there are factors that may be considered by the Department under the Clean Water Act that may result in the modification of such effluent limitations or the deadline by which compliance with limitations must be achieved. Based on site-specific evaluations and economic considerations, effluent limitations developed based on new water quality criteria may be modified, or more time for compliance may be granted under applicable regulations.

Please see Comment #10 of this document for the Departments response to the need for the Regulation and responses to comments #11 and #15 for additional discussion on economics.

**15.) Comment:** It would appear that PADEP is not mandated to establish or revise water quality standards if the imposition of such would require the use of more stringent technology or will cause substantial and wide spread economic and social impacts (including, but not limited to, factors such as unemployment, plant closures, or changes in the government fiscal base). **(21)**

While a cost/benefit analysis is not part of the water quality criteria process, the establishment of new criteria, or overly protective criteria, do have a real and unavoidable financial impact on the regulated community. **(17)**



The effects of the proposed rulemaking would have a direct impact on the economy by placing an unequal burden on Pennsylvania based coal mining companies. **(19)**

The proposed criteria would stifle job creation. **(12)**

The implementation of the proposed standards will undoubtedly impact all industries in the Commonwealth at a time that our economy is teetering toward another recession and unemployment figures are on the rise in the Commonwealth. **(12)**

**Response:** Potential impacts associated with the adoption of new criteria may take the form of additional treatment requirements. Sometimes these requirements require costly upgrades. If new criteria apply to a facility and if treatment requirements require significant and costly changes operationally, there are regulatory mechanisms in place, through the NPDES permitting program, to manage an appropriate schedule for meeting the new standards.

Any reduction in the total toxic load in Pennsylvania waterbodies is likely to have a positive effect on the human health of Pennsylvanians. This will translate into an as yet unknown economic benefit through avoided cleanup costs later in time as well as avoided costs for the treatment and caring for persons with illnesses and disabilities that can be reasonably attributed to environmental contaminants in surface water.

Protection of water quality, up front, reduces the need for costly remedial measures that are often difficult to retrofit. In addition, maintenance of water quality eliminates the need for spending taxpayer dollars to meet additional regulatory obligations such as federally mandated total maximum daily loads (TMDLs). If a waterbody becomes impaired and is not meeting its protected water uses, the Commonwealth will be obligated to develop TMDLs and impose more stringent water quality standards. By maintaining the appropriate water quality to protect the uses, this additional cost can be avoided.

There are economic benefits to be gained by maintaining clean water for potable water supply use. Water suppliers, and their customers, may benefit from lower pretreatment costs if water is withdrawn that meets the surface water quality standards. Assuring the availability of clean water will cut down on the costs to consumers for purchasing household pretreatment or water filtration systems and bottled water.

In addition, reduced toxics in Pennsylvania's waterways will likely increase recreational fishing and tourism to swimming and fishing locations throughout the state. Persons who recreate on the waters and who fish, both for sport and consumption, will benefit from better water quality protection.

**16.) Comment:** Describe who and how many people will be adversely affected by the regulation. How are they affected? **(197)**

**Response:** Persons proposing new or expanded activities or projects or applying for renewal of existing permits which result in discharges to waters of the Commonwealth may be adversely affected by the proposed regulations since they are required to provide effluent treatment according to the water quality criteria and designated use. This proposal, intended to update the

water quality standards for the Commonwealth, may result in higher design engineering, construction, and treatment costs to meet the more stringent criteria for selected parameters. The proposal will be implemented through the National Pollutant Discharge Elimination System (NPDES) since the stream use designation and water quality criteria are the major bases for determining allowable stream discharge effluent limitations.

Before a new criterion is used to generate an effluent limit in a permit, discharge monitoring takes place that indicates whether the parameter is present at a level of concern. The permit writer will develop an effluent limit which considers the water quality criterion as well as other factors such as mass and flow, to develop the limit. Once that limit is developed, the discharge will be measured against it. Although it is unknown at this time how many discharge facilities the new standards will apply to, industries that might be affected are identified in the rationale documents attached.

Persons proposing new or expanded activities or projects or applying for renewal of existing National Pollutant Discharge Elimination System (NPDES) permits which result in discharges to waters of the Commonwealth may be adversely affected by the regulations since they are required to provide effluent treatment to meet limitations that are calculated based on the water quality criteria and surface water uses. These regulations are intended to update the water quality standards for the Commonwealth and may result in higher design engineering, construction, and treatment costs to meet the more stringent criteria for selected parameters. Before a new criterion is used to generate an effluent limit in a permit, discharge monitoring takes place that indicates whether the parameter is present at a level of concern. The permit writer will develop an effluent limit which considers the water quality criterion as well as other factors such as mass and flow, to develop the limit. Once that limit is developed, the discharge will be measured against it. Although it is unknown at this time how many discharge facilities the new standards will apply to, industries that might be affected are identified in the rationale documents attached.

The following industries might be affected by this rulemaking:

For acrolein, persons who produce polyester resin, polyurethane, propylene glycol and acrylic acid and who use it as an herbicide to control submersed and floating weeds and algae in irrigation canals.

For nonylphenol, persons who use it as a chemical intermediate in the processing of other chemicals and is also found in wastewater treatment plant effluent as a breakdown product from surfactants and detergents.

For sulfonate compounds and resorcinol, persons who use detergents in industry, agriculture, coal mining drilling fluid additives and formulations for oil recovery operations or persons who use it as a chemical intermediate for the synthesis of pharmaceuticals and in the production of dyes and plasticizers.

For phenols, persons who use it for conversion to plastics or related materials and who use it in creating polycarbonates, epoxies, nylon, detergents, herbicides and pharmaceuticals.

For benzyl chloride, persons who use it as an intermediate in the processing of dyes, pharmaceuticals and perfumes or in the production of synthetic tannins and as a gum inhibitor in gasoline.

For acrylamide, persons who use it as an industrial chemical in the production of polyacrylamides, which are used as flocculants for clarifying drinking water and treating municipal and industrial effluents. It may also be used by persons to improve production from oil wells, in making organic chemicals and dyes, in sizing of paper and textiles, in ore processing and in the construction of dam foundations and tunnels.

For 2-Butoxyethanol, persons who use it as a solvent in spray lacquers, enamels, varnishes and latex paints and as an ingredient in paint thinners and strippers, varnish removals and herbicides. Persons may also use it as a bulk additive in the hydro-fracking process.

For cis-1,2-dichloroethylene, persons who use it as a solvent for waxes, resins, polymers, fats and lacquers.

For cyclohexylamine, persons who use it in boiler water treatment as a corrosion inhibitor, in rubber and plastic synthesis, in agricultural chemicals and as an emulsifying agent.

For strontium, persons who use it in ceramics, glass products, pyrotechnics, paint pigments and fluorescent lights. It is also produced in natural gas production.

For 1,2,4 and 1,3,5 Trimethylbenzene, persons who produce it in the petroleum refining process and who use it as a solvent in coatings, cleaners, pesticides and inks.

**17.) Comment:** List the persons, groups or entities that will be required to comply with the regulation. Approximate the number of people who will be required to comply. **(197)**

**Response:** Persons with new or existing discharges into surface waters of the Commonwealth must comply with the regulation. Although persons “required to comply” may overlap with the same group of persons “adversely affected by the regulation,” some persons may volunteer to comply, such as a person conducting a remediation, in order to obtain liability relief.

**18.) Comment:** Provide a specific estimate of the costs and/or savings to the regulated community associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived. **(197)**

**Response:** Please see the response to Comment #20 for more detail. In accordance with the federal Clean Water Act, the Department is not to consider the cost of compliance when developing water quality criteria. As for implementation of these criteria, please consider the following:

Where a water quality standard exists for a pollutant, and in the Department’s judgment the discharge of such pollutant from a point source will be at a concentration that has the reasonable potential to exceed that standard, the Department is required to establish monitoring requirements and/or water quality-based effluent limitations for the pollutant in an NPDES permit. These effluent limitations are calculated based on the water quality criteria. However, there are factors that may be considered by the Department under the Clean Water Act that may result in the modification of such effluent limitations or the deadline by which compliance with limitations must be achieved. Based on site-specific evaluations and economic considerations, effluent limitations developed

based on new water quality criteria may be modified, or more time for compliance may be granted under applicable regulations.

Accurate costs and savings, however, cannot be determined at this time since such cost analysis is based on site-specific considerations that must be evaluated on a case-by-case basis.

**19.) Comment:** Determining whether the regulation is in the public interest: Section 5.2 of the Regulatory Review Act directs IRRC (Commission) to determine whether a regulation is in the public interest. When making this determination, the Commission considers criteria such as economic or fiscal impact and need. To make that determination, the Commission must analyze the text of the proposed rulemaking and the reasons for the new or amended language. The Commission also considers the information a promulgating agency is required to provide under §745.5(a) in the Regulatory Analysis Form (RAF).

The information contained in the RAF is not sufficient to allow this Commission to determine if the regulation is in the public interest. Of particular concern are the Board's responses to the following questions:

- Describe who and how many people will be adversely affected by the regulation. How are they affected? (RAF Question #12)
- List the persons, groups or entities that will be required to comply with the regulation. Approximate the number of people who will be required to comply (RAF Question #13)
- Provide a specific estimate of the costs and/or savings to the regulated community associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived. (RAF Question #14)
- Provide a specific estimate of the costs and/or savings to local governments associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived. (RAF Question #15)
- Are there any provisions that are more stringent than federal standards? If yes, identify the specific provisions and the compelling Pennsylvania interest that demands stronger regulations. (RAF Question #21)
- How does this regulation compare with those of other states? How will this affect Pennsylvania's ability to compete with other states? (RAF Question #22)

In the RAF submitted with the final-form rulemaking, the Board should provide more detailed information required under §745.5(a) of the RRA. **(197)**

**Response:** The RAF has been modified for the final rulemaking to provide more detailed information.

**20.) Comment:** Possible conflict with statutes: We are aware of the Board's position that under the Clean Water Act (CWA), the DEP is not to consider achievability or the cost of compliance when developing water quality criteria. However, both the Clean Stream Law (Law) and the Regulatory Review Act (RRA) require it. If the Board submits the final-form regulation without addressing

economic impact as required by the Law and the required cost estimates of the RRA and RAF, we request a specific citation to the section of the CWA that is being relied on and a detailed explanation of why the CWA takes precedence over the Law and the RRA. (197)

**Response:** The Department does not consider economic impacts or achievability in the development of the numeric water quality criteria. The criteria are instream goals based on the best available scientific information and research. These instream goals, designed to protect designated water uses, are used to calculate allowable effluent limitations in NPDES permits. States are required to develop standards, and the corresponding water quality criteria, based on section 303(c)(2)(A) of the CWA. The federal CWA requires the following factors to be taken into consideration:

“Such standards shall be such as to protect the public health or welfare, enhance the quality of the water and serve the purposes of this Chapter. Such standards shall be established taking into consideration their use and value for public water supplies, propagation of fish and wildlife, recreational purposes, and agricultural, industrial, and other purposes, and also taking into consideration their use and value in navigation.” 33 U.S.C. §1313(c)(2)(A).

The federal CWA does not discuss economic considerations when describing the factors to be evaluated in the development of water quality criteria. By contrast, Congress specifically called for consideration of economic and technical feasibility in the development of primary drinking water standards under the federal Safe Drinking Water Act. For example, if a primary drinking water regulation is expressed as a maximum contaminant level (MCL), “economic and technical feasibility must be considered to ascertain the level of such contaminant in water in public water systems.” 42 U.S.C.A. § 300f(1)(C). This distinction is indicative of Congress’ intent to not allow consideration of feasibility and economic impacts when developing water quality criteria under the requirements of the Clean Water Act.

Under Pennsylvania law, water quality criteria are promulgated pursuant to the CSL. Section 5 of the CSL discusses the circumstances that should be taken into consideration when adopting regulations. With regard to economic review, the section reads as follows:

The Department, in adopting rules and regulations, in establishing policy and in priorities, in issuing orders or permits, and in taking any other action pursuant to this act, shall, in the exercise of sound judgment and discretion, and for the purpose of implementing the declaration of policy set forth in section 4 of this act, consider, *where applicable*, the following:

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(5) The immediate and long-range economic impact upon the Commonwealth and its citizens.  
35 P.S. § 691.5(5) (emphasis added).

If the CSL and the federal CWA are read in *pari materia*, the development of numeric water quality criteria should not take economics into consideration since it is not “applicable” under the federal law. As explained above, the EPA water quality standards program under the CWA does not allow consideration of economics in the development of water quality criteria.

Apart from consideration of economics in the development of numeric criteria, the decision *whether* to adopt a standard for a particular pollutant is a discretionary action by the state. Primarily, the water quality standards program proposes criteria based on the presence or expected presence of the parameter in effluent wastestreams and the state of the science. In addition, the Department proposes standards that U.S. EPA recommends based on its scientific evaluations. Overall, the Department's decisions about whether to develop criteria, and what the criteria should be, is driven in large part by the latest, peer-reviewed scientific studies available for a pollutant of concern.

Pennsylvania's water quality regulations do take economics into consideration in areas other than numeric criteria development. For example, a "*less restrictive use*," than the designated use, may be adopted when the designated use is more restrictive than the existing use. See 25 Pa. Code § 93.4(b). This evaluation is known at the federal level as a "use attainability analysis", as discussed above. Under this evaluation, if the designated use cannot be attained by implementing effluent limits or cost effective and reasonable best management practices, and more stringent controls would result in *substantial and widespread economic and social impact*, then a less restrictive use may be adopted. See 25 Pa. Code § 93.4(b)(6).

Another opportunity to consider economics occurs when a point source discharge is proposed for a high quality water. After a nondischarge analysis and a nondegrading discharge analysis are performed, a discharger may demonstrate that lowering water quality is necessary to accommodate *important economic or social development* in the area in which the waters are located. See 25 Pa. Code § 93.4c(b)(1)(iii).

A third opportunity to consider economics in terms of feasibility occurs when the Department issues a NPDES permit. NPDES permits include effluent limits that are commonly set as technology-based limits. Technology-based effluent limits are the minimum level of control that must be imposed in an NPDES permit. See 40 CFR § 125.3. These limits are established as being achievable by using available technology. If the limits achievable using the available technology are not sufficient to prevent impacts from discharges into receiving waters, water quality-based effluent limits are imposed which are based on the water quality standards.

To the extent that a water quality-based effluent limit cannot be implemented immediately upon permit issuance, schedules of compliance, which are considered an element of "effluent limitations," may be used to phase in the new technology or remedial measures. See 33 U.S.C. § 1362(11). In addition, the CWA and the regulations promulgated for the NPDES program provide for "variances" from the water quality standards, such as § 316(a) which allows a variance for the thermal component of any discharge. 33 U.S.C. § 316(a), 40 CFR §§ 124.62 and 124.66.

Therefore, the current regulatory action is consistent with Section 5(a) of the Law (35 P.S. §691.5(a)), since that section of the law requires the referenced factors to be considered, where applicable, when adopting rules and regulations. As described, these factors are not applicable when setting or developing the water quality standards under the federal mandates established by the CWA requirements.

DEP, through its water quality program, has received federal approval to implement provisions of the CWA throughout Pennsylvania. DEP has been given authority by the legislature, under the CSL, to protect water resources. The CSL provides the breadth necessary for the state to receive federal

approval to carry out its obligations for the water quality program under the CWA. Generally, the water quality program consists of two prongs: the scientific standards for clean water (Chapter 93) and the implementation tools to achieve the standards (Chapters 92a and 96). In order for Pennsylvania to continue to implement a state's obligations under the CWA, its standards must be consistent with the federal requirements. While direct costs are not taken into consideration when scientific standards are developed, costs are evaluated when technology and variances are applied to implementation. Further, the site-specific nature of the application of water quality standards in a permitting context (i.e., size of the receiving waterbody and quantity of pollutant in the discharge) makes it impractical and imprecise to estimate across-the-board direct costs. Some direct costs may be calculated when the scientific standards are developed, such as laboratory costs for sampling. These calculations can be universally applied to all persons who are sampling. However, such costs are not part of a scientific standard calculation. Although all direct costs of implementation may not be calculated at the time a scientific standard is developed, the Department submits that this should not prevent approval under the Regulatory Review Act. Direct costs are one of several factors that the Commission must consider in its determination that a regulation is in the public interest.

**21.) Comment:** Provide a specific estimate of the costs and/or savings to local governments associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived. **(197)**

**Response:** Entities within local governments that are responsible for operating and maintaining sewage or wastewater treatment facilities (i.e., publicly owned treatment works--POTWs) must comply with applicable water quality standards, and relevant effluent limits or monitoring requirements as contained in the NPDES permit they hold for such facilities. It is unknown at this time whether POTWs will develop their own pretreatment programs, for dischargers to the POTW, or whether they will choose to treat for any additional, applicable toxic pollutants based on the new criteria. It is also unknown what the associated costs could be for the indirect discharger with pretreatment requirements.

When the POTWs renew their pollutant discharge permits, the Department will evaluate each facility using the new water quality criteria. If available information indicates that no significant pollutant concentrations will result in a failure to meet the toxics parameter, no limits for those toxics will be placed in a permit. If available information is not sufficient to make a determination whether new discharge permit limits apply, the Department will include expanded monitoring for toxic pollutants. Such monitoring is included in the facility's discharge monitoring report. Permits remain in effect for five years. The Department believes approximately three years of monitoring data will be needed to properly evaluate permit limits based on the new water quality standards. By conducting monitoring in the first three years of the permit cycle, facilities will have at least two years of the cycle to consider any changes to their operations or alternative effluent controls that may be needed to meet new limits in the next permit cycle.

It should be noted that under federal regulations, only "major POTWs" are required to conduct monitoring for Whole Effluent Toxicity (WET), i.e., those with design flows at or above 1 MGD (million gallons per day).

**22.) Comment:** Are there any provisions that are more stringent than federal standards? If yes, identify the specific provisions and the compelling Pennsylvania interest that demands stronger regulations. **(197)**

**Response:** No. The proposed regulations are not more stringent than the companion federal standards allow. Under federal law, surface water standards are primarily a state responsibility. EPA provides oversight and guidance and approves state standards for surface water, but does not promulgate standards that apply nationwide. Where a state's standards are inadequate, EPA will promulgate standards for the state.

**23.) Comment:** How does this regulation compare with those of other states? How will this affect Pennsylvania's ability to compete with other states? **(197)**

**Response:** Other states are also required to maintain water quality standards with similar requirements, and must review those water quality standards at least once every three years. The triennial review process is specific to each state, and must address the specific environmental issues and needs of that state. Each state's water quality standards program must consider the best available science in developing standards that will protect their specific designated and existing uses. The regulatory amendments will not put Pennsylvania at a competitive disadvantage to other states.

### *Specific Comments by Section or Topic*

#### **General Comments on Public Notification Process (§93.4d)**

**24.) Comment:** Regarding improved public notification, I suggest a more diligent effort be made to make all landowners aware of any re-designation of stream segments. The designation has a direct impact on activities in a watershed and may significantly reduce the capabilities and value of any property. Therefore, all owners should be directly notified as is done in resource permitting, with clear and detailed explanation of the meaning of upgrades to classification. **(13)**

Subsection (a) is being amended to delete the requirement that petitions or assessments of stream redesignations be published in local newspapers. Instead, the required notice can be made "by other means designed to effectively reach a wide audience." A commentator has suggested that all owners of property affected by the potential redesignation be directly notified of the petition and assessment. Since redesignations of streams could have a fiscal impact on land owners, we believe this suggestion is reasonable and ask the Board to consider it as it develops the final-form regulation. **(197)**

**Response:** While the Department acknowledges that notifying the public of stream redesignation rulemaking activities is important, it would be onerous and costly to require the Department to directly notify all property owners, as suggested by the commentator; therefore the Board is not including direct property owner notification requirements in the final rulemaking. The Department believes it has effective measures in place to ensure the public is informed of stream redesignation activities. For example, the Department posts all of its stream redesignation rulemaking activities



on its website at [http://www.portal.state.pa.us/portal/server.pt/community/water\\_quality\\_standards/10556](http://www.portal.state.pa.us/portal/server.pt/community/water_quality_standards/10556) (select "Monitoring", then "Stream Redesignations"). Any interested member of the public can visit the Department's website at any time to get the latest and most up-to-date information regarding the Department's actions pertaining to stream redesignations. The Department will continue to post all of its stream redesignation rulemaking activities on its website. As an additional opportunity for notice, the Department is considering the issuance of a press release whenever an activity occurs related to stream redesignations. Currently, any member of the public who is interested about stream redesignation activities may register on the Department's website to receive direct electronic notification of press releases issued by the Department. The Department believes these outreach measures will be more effective in notifying the public about stream redesignation rulemaking activities and will increase the effectiveness of the public notification provisions in § 93.4d in comparison to relying on one-time notices published in local newspapers that often go unnoticed by the public. However, the Department may rely on newspaper notices to inform the public of stream redesignation rulemaking activities when it may be more appropriate to do so.

These improvements will substantially increase the effectiveness of the public notification provision while providing a significant cost savings to taxpayers.

**25.) Comment:** I am generally supportive of changes to PA Code 93.4d as included in this triennial review of water quality standards. **(10)**

**Response:** The Department appreciates this comment.

#### **General Comments Supporting Chloride**

**26.) Comment:** We support the proposed criteria for chloride, but recommend the inclusion of a margin of safety for the chronic chloride criterion based on the current state of scientific and technical knowledge as fully described in the attached Review of the 2012 Proposed Water Quality Criteria for Chloride for the Protection of Aquatic Life In Pennsylvania by the Stroud Water Research Center. **(25)**

We support the addition of chloride criteria for the water uses CWF, WWF, TSF and MF. Based on our analysis of PFBC water quality data, we support and recommend the calculation of the 1-hour average CMC. We believe this calculation is appropriate and will provide necessary protection for aquatic communities throughout the Commonwealth. **(7)**

From a scientific point of view, we agree the Iowa equation-based approach for establishing chloride water quality criteria is a better choice over the current national aquatic life criteria...because the Iowa research and testing demonstrates that chloride toxicity is highly dependent on water hardness, and to a lesser degree, sulfate concentrations. **(17)**

We also support the science based approach for the chloride CCC criterion; however, our analysis of PFBC water quality data suggests that this criterion would be less protective to aquatic life than the EPA 1988 National Aquatic Life Criteria. We recommend that the Department review water quality data sets that may refine and improve the validity of the CCC equation that would be applicable to Commonwealth waters. **(7)**

The Department has provided sound science regarding chloride. The Commonwealth is required to ensure water quality for all Pennsylvanians and reviewing sound science and revising the criteria is warranted. **(10)**

**Response:** The Department is recommending the Board withdraw the proposed equation-based (both the acute and chronic equations) aquatic life criteria for chloride. The overall proportion of ions (ion matrices) in the water affects the toxicity of individual ions such as chloride. There is now more recent and on-going research, much of it funded by EPA, examining the relationship between various ion matrices and toxicity. A workshop attended by major researchers in April 2012 titled “Effects of Major Ions on Aquatic Organisms” focused on ion matrices and their effects on sensitive species. The ion matrices would be most problematic in Pennsylvania’s calcium-dominated limestone streams or where the source of chlorides is other than sodium chloride. The Department requires additional time for the studies to be completed and evaluated and to assess the range of the natural ionic compositions of the state’s waters. The Canadian Council of Ministers of the Environment released guidelines for chloride criteria development in 2011. The Stroud Water Research Center prepared an expert report on ambient water quality criteria for chlorides (Stroud Report #: 2010004 June 14, 2010). The report concluded that the criteria proposed by the Department may not be protective of sensitive species and, as a result, they recommended other more protective criteria.

The Department recognizes it needs to conduct a review and evaluation of recent data and developing science before adopting a new criterion, but that it must be done in a timely manner. The Water Resources Advisory Committee (WRAC) at their November 28, 2012 meeting adopted a resolution that is supportive of the development of chloride criteria before the next triennial review.

### **General Comments Opposing Chloride**

**27.) Comment:** Oppose the inclusion of chlorides in the final Chapter 93 rulemaking. **(1, 3, 9, 12, 13, 16, 18, 19, 24)**

**Response:** The Department is recommending the Board withdraw the proposed equation-based (both the acute and chronic equations) aquatic life criteria for chloride. The overall proportion of ions (ion matrices) in the water affects the toxicity of individual ions such as chloride. These ion matrices and their associated differences in ionic toxicity are especially problematic in those Pennsylvania surface waters where the source of chlorides is other than sodium chloride. There is recent and on-going research, much of it funded by EPA, which is focused on the relationship between ion matrices and toxicity differences. The Canadian Council of Ministers of the Environment released guidelines for chloride criteria development in 2011. The Stroud Water Research Center prepared an expert report on ambient water quality criteria for chlorides (Stroud Report #: 2010004 June 14, 2010). The report concluded that the criteria proposed by DEP may not be protective of sensitive species and, as a result, they recommended other more protective criteria.

**28.) Comment:** DEP has failed to document any threat to Aquatic Life or Human Health that would justify the need for establishing chloride criteria at this time. **(12, 17, 19, 20)**

DEP has not conducted state-specific water quality sampling and analysis to determine if Chloride should be in the Triennial Review package. There have been no studies which include chemical sampling and analysis, biological surveys or bioassays for Chloride. **(3, 12, 20)**

DEPs own chemical data alone fails to show a need for additional standards for chloride. We have reviewed DEP's existing chemical data published on its Southwest Regional Office website (Mon River TDS Chloride Sampling Results). **(3)**

Further background analysis of instream chloride concentrations in conjunction with statewide hardness and sulfate levels is needed to justify a new chloride standard. Iowa conducted a "statewide TDS, chloride, and sulfate monitoring program and built a data-base for use in the economic impact analysis of any future TDS and chloride standards. This type of investigation is needed in all Pennsylvania streams (not just Monongahela River and Dunkard Creek) in order to justify compliance costs. **(8)**

The chloride standard is no longer needed as gas industry is now recycling 90% of their flow back waters. There is no scientific evidence that this is a problem which requires a statewide standard. **(12)**

**Response:** This statewide criterion is being developed for all sources of chloride; and is not industry specific. The Department does not acknowledge a lack of need for aquatic life protection from the effects of chloride. In fact, the Department is recommending the Board withdraw the current chloride proposals but will continue to monitor the quantities discharged from various sources and measure stream concentrations while reviewing the developing science on chlorides. The WRAC has recommended that the Department continue its development of aquatic life criteria for chloride.

**29.) Comment:** Adopting the Iowa equations based solely on a literature review is not an acceptable method for establishing water quality criteria applicable to Pennsylvania's waters...We encourage PA DEP to follow the path of the Iowa Department of Natural Resources and conduct adequate and statistically valid Pennsylvania specific water quality sampling and analysis, biological surveys and acute and chronic bioassay studies. **(17)**

Promulgation of the chloride standard should be based on more than just a review/evaluation of Iowa. **(20)**

**Response:** The Department proposed aquatic life criteria designed to be protective from the effects of chloride. The Great Lakes Environmental Center (GLEC) in Columbus, OH and the Illinois Natural History Survey (INHS) at Champaign, IL worked collaboratively under a contract with the EPA to determine the toxicity of chloride on four freshwater invertebrate species that are representative of species in Pennsylvania. The current state of the science at that time supported, and still supports, the Iowa chloride criterion under certain conditions. The Department investigated all known peer-reviewed pertinent research and toxicological studies and considered all known approaches to establishing an aquatic life criterion for chloride. The Department is recommending the Board withdraw the chloride criteria, not because the Iowa criterion is flawed but rather it is not completely applicable statewide to the ionic composition found in the waters of the Commonwealth.

During the development of state or tribal water quality standards, it is atypical for the promulgating body to actually conduct the toxicological research that results in the final numeric criteria. It is not reasonable to expect states and tribes to be able to conduct toxicological research of chloride (or any other chemical) to the same scale and degree of technical expertise and detailed analysis as was completed by the United States Environmental Protection Agency in cooperation with the Great Lakes Environmental Center and the Illinois Natural History Survey. During the development of water quality standards, states and tribes can and often do rely on applicable, valid toxicological studies that have been peer-reviewed and published in scientific journals. Criteria that have been developed by other states and tribes can generally be applied elsewhere; however these equation-based criteria which were promulgated by Iowa may not be completely appropriate in all Pennsylvania waters because of the differences in the ionic matrices between laboratory conditions and naturally occurring conditions found throughout Pennsylvania.

**30.) Comment:** DEP already has the tools to protect aquatic life in receiving waters from excess salinity associated with chlorides – those tools being Osmotic Pressure (OP) water quality standards of Chapter 93 and the total dissolved solids (TDS) discharge standards of Chapter 95, so there is no need to have a chloride-specific standard. **(3, 8, 20)**

PA has a standard for osmotic pressure and it is intended to protect aquatic life, therefore PA does not need additional chloride aquatic life standards. **(20)**

DEP is also proposing aquatic life standards for chlorides. The proposed standard for chlorides is based on a water hardness-based formula...Our concern is that this parameter is a primary constituent of Total Dissolved Solids (TDS), which DEP discussed at-length with the regulated community during the Chapter 95 rulemaking process due to the substantive costs involved with TDS treatment and removal. **(1)**

The regulated community recognizes that the impetus for a chloride water quality standard is driven by the recent natural gas exploration boom in the Commonwealth. The promulgation of the Total Dissolved Solids (TDS) in 2011 coupled with the voluntary cessation of natural gas produced wastewater to municipal sewage treatment plants should have abated DEP's concerns. It would be prudent for DEP to analyze the impact of the TDS regulation before proceeding with yet another standard. **(16, 18)**

**Response:** The "Green Book" (*Water Quality Criteria Report of the National Technical Advisory Committee to the Secretary of the Interior*. Federal Water Pollution Control Administration. April 1, 1968) on which the 50 milliosmole per kilogram Osmotic Pressure (OP) criterion is based states: "If the dissolved materials **are relatively innocuous, having only an osmotic effect**, it is judged that the total dissolved materials in a water course may be increased to a certain extent but they should not exceed 50 milliosmoles if the fauna is to be maintained" (**emphasis added**). Toxicity testing has shown sulfate and chloride ions are not innocuous. OP is not sufficiently protective when certain individual ions (including chloride and sulfate) dominate the matrix and therefore criterion for individual ions is necessary in conjunction with the current OP criterion.

The current OP standard of 50 milliosmoles per kilogram is not overly protective given that most aquatic life cannot survive above this value. This aquatic life criterion remains important because OP pressure in and of itself will kill aquatic organisms.

The 25 Pa. Code 95.10 treatment requirements for point sources of TDS and certain component dissolved solids do not obviate the need for appropriate and comprehensive instream water quality criteria. Firstly, treatment requirements apply only to effluent, not to instream water quality. Instream concentrations of chloride or sulfate that are deleterious to aquatic life and human health are not prevented by setting treatment requirements on certain point sources. The treatment requirements do not apply to all point sources, and do not address nonpoint sources. Secondly, the development of the §95.10 treatment requirements reinforces rather than replaces the need for appropriate and comprehensive instream water quality criteria for chloride and sulfate. There is broad recognition (40 Pa.B. 4835) of TDS and its component solids, including especially chloride and sulfate, as increasingly important pollutants of concern in Pennsylvania. While the §95.10 treatment requirements serve to contain the TDS issue statewide, development of appropriate instream criteria is the logical next step in controlling these pollutants in specific water quality scenarios.

### **Comments Concerning Chloride Treatment Technique: Cost & Achievability**

**31.) Comment:** The technology needed to remove chlorides has not been developed for use in the electric power industry applications and is not in commercial use in the USA at flows that commonly occur at many of the electric generating plants in PA.

The information in the preamble regarding the costs and the maturity of the available technology (to remove chlorides) is wholly inaccurate. **(21)**

We believe with respect to the new criteria for chloride that this financial burden could be in the billions of dollars to industry. At a time when the economy... as a whole is performing poorly at best,..., it is questionable as to why PA DEP would propose new water quality criteria that they readily admit will adversely affect the economic well-being of the regulated community. **(17)**

Our collective concern (*with chloride criteria*) is based on the significant potential impacts to the Pennsylvania economy without any clear need or pressing threat to the aquatic environment. **(1)**

There is no environmental benefit for most PA waters to offset these economic concerns. Chamber members are very concerned about the economic impact of chloride. **(20)**

A strict chloride discharge concentration will likely result in the abandonment of many and perhaps thousands of conventional oil and gas wells. The imposition of a strict chloride discharge concentration will render many existing oil and gas companies without viable produced water management alternatives, which will lead to the addition of many more abandoned wells to the already burdensome orphan well problem in PA. **(11, 26 – 196)**

The impact of your proposed actions will result in the majority of smaller companies engaged solely in the development and production of crude oil from shallow reservoirs going out of business. **(18)**

We oppose the proposed standard for Chloride as it would have considerable impacts upon the oil and gas industry. **(6, 8, 11, 24, 26 – 196)**

The treatment technologies require various treatment steps in advance of the chloride/TDS treatment process to remove materials that would foul or ruin the reverse osmosis and evaporation/crystallization units.

- It would involve extremely high energy usage.
- It would incur a high cost for installation and maintenance
- The by-products of the treatment technologies would be large volumes of concentrated brine and salt cake waste and these could be hazardous

The technology needed to remove chloride has not been developed for use in the electric power generating industry's applications and is not in commercial use in the US at flows that typically occur from many of the electric generation plants in Pennsylvania. The types of wastewater that could be impacted in the power industry could include the following list (a to g). Cost of retrofitting these technologies to existing systems along with the cost of maintenance and operation would be great.

- a) flue gas desulfurization (FGD) purge water
- b) Cooling tower blowdown
- c) Landfill leachate
- d) Demineralization regeneration water
- e) Ash pond effluent
- f) coal pile runoff effluent
- g) Wetland mitigation water.

Conemaugh completed a Flue Gas Desulfurization Zero Liquid Discharge (FGD ZLD) Technology study (Aug 2009 to June 2010). Conemaugh operates a wet FGD system WWTP. We (the commentator) have listed the ZLD technologies and provided the final assessment. **(20)**

The following factors limit the alternative waste brine disposal options available to the producers of crude oil from shallow formations:

- The subsurface geological conditions in Northwestern PA are such that there are no suitable saltwater aquifers present which would permit the subsurface underground injection of oilfield waste brines at depths which make this disposal alternative economically viable.
- The surface water treatment process for extracting chlorides from waste brines are prohibitively costly for small production companies, producing stripper volumes of crude oil, to be able to afford while maintaining the economic viability of their operations. As, well, such extraction methods produce a waste product of highly concentrated brine which thereby creates another disposal problem. **(18)**

**Response:** The Department is recommending the Board withdraw the proposed chloride criteria.

### ***Comments Concerning Dissolved Oxygen***

#### **General and Supportive Dissolved Oxygen Comments**

**32.) Comment:** Sound science regarding dissolved oxygen has been provided. The Commonwealth is required to ensure water quality for all Pennsylvanians and reviewing sound science and revising the criteria is warranted. **(10)**

We support the change from discrete minimum daily averages to 7-day averages as these standards are more representative and better capture the temporal variability in streams and water bodies. **(21)**

**Response:** Thank you for your comments.

**33.) Comment:** Throughout the dissolved oxygen sections of the triennial review document, the term “Salmonid” has been used. This term has been converted into English from Salmonidae and is no longer a proper noun and should not be capitalized – salmonid should be used. **(7)**

**Response:** The Department appreciates this comment. Any future use of the word salmonid will not be capitalized, and has been corrected in the final rulemaking.

**34.) Comment:** For the dissolved oxygen (DO) criteria, please explain how the proposed criteria will be protective of designated uses. For example, in the rationale document, PADEP indicates that for the 7-day average it has chosen the qualitative level of effect “slight production impairment” value from the summary of DO concentrations found on page 31 of EPA’s Ambient Water Quality Criteria for Dissolved Oxygen (EPA 440/5-86-003, April 1986), and “moderate production” value for the minima. PADEP needs to indicate in the rationale why it believes these levels are protective of aquatic life in the Commonwealth. **(22)**

**Response:** The proposed adoption of the risk level values for criteria is the Department’s interpretation of the appropriate use of EPA’s recommended criteria document for Pennsylvania’s surface waters. The Department reviewed literature and compared dissolved oxygen concentration values from multiple field and laboratory studies to the risk level assessment in the EPA 1986 document and determined that the values listed as “slight production impairment” and “moderate production” match those from various literature resources and are protective. Since, according to literature, the proposed minimum values are conservative and would likely be protective on their own, the 7-day average provides an additional margin of safety.

**35.) Comment:** Regarding the application of the DO criteria, the proposed PA Code 93.7(b) allows for limiting the extra seasonal DO protection for salmonids if it can be demonstrated that the early life stages are not present. EPA reminds PADEP that the application of criteria is based on designated use, not existing use. The more stringent DO should apply for any water designated for cold water fishes (CWF) where the designated use has been defined as maintenance and propagation of salmonids. **(22)**

**Response:** The Department has determined that it is appropriate to allow discretion as to whether or not propagation is occurring in surface waters that have a designated use of Cold Water Fishes. The definition of *Cold Water Fishes* in §93.3 Protected Water Uses is “maintenance **or** propagation, **or** both, of fish species including the family Salmonidae and additional flora and fauna which are indigenous to a cold water habitat (**emphasis added**).” The Department recognizes that propagation may not be occurring in all surface waters designated Cold Water Fishes. It is appropriate to protect early life stages unless it’s been documented that natural reproduction (propagation) is not occurring or has not occurred.

**36.) Comment:** Dissolved Oxygen Conflict with Designated Use – proposed changes to DO standards are generally supported by the commentator, but requests that DEP consider potential implications of higher 7-day average and minimum DO requirements for the DO2 and DO3 especially where natural stream conditions (ie no anthropogenic impacts) exist that do not meet these revised criteria. **(20)**

**Response:** Provisions in §93.7(d) allow the Department discretion regarding natural quality of surface waters, including dissolved oxygen concentrations that are naturally lower than the current or proposed criteria.

### **Comments Concerning Sulfates**

#### **General Comments Supporting Sulfates**

**37.) Comment:** I applaud PA's effort to adopt a sulfate standard. **(2)**

Sound science regarding sulfate has been provided. The Commonwealth is required to ensure water quality for all Pennsylvanians and reviewing sound science and revising the criteria is warranted. **(10)**

We reviewed the Illinois Natural History Survey publication. Previous water quality standards for PA were restricted to potable water supplies and the proposed sulfate criterion expands sulfate protections to all water within the Commonwealth. We support the addition of these criteria. **(7)**

**Response:** The Department appreciates these supportive comments. However, the Department will continue to review updated science currently under development before proceeding with a revised sulfate standard.

#### **General Comments Opposing Sulfate**

**38.) Comment:** Oppose the inclusion of sulfate in the triennial review. **(6, 16)**

Implementation of this state-wide standard is not good science. PA consists of many various terrains each with its own chemical signature and a one-size-fits-all approach is not the answer and this is further magnified when the standard is taken from Illinois and the 2 states are not comparable. Dr. Soucek publically said that using the Illinois standard in PA would not be accurate. **(12)**

The ionic composition used to develop the Illinois sulfate standard may not be reflective of the ionic composition of PA's streams with high sulfate and therefore not adequately protective. **(2, 3, 9)**

I am concerned that a chronic standard is not proposed. Subsequent to the development of the proposed standard, work has been done by me and others that show the chronic effects of sulfate are observable at low concentrations. I believe that developing a chronic standard in addition to an acute standard is warranted. **(2)**



It is inappropriate to use the Illinois work to develop PA's standard. **(3, 19)**

Promulgation of the sulfate standard should be based on more than just a review/evaluation of Illinois. **(20)**

**Response:** The Department is recommending the Board withdraw the proposed equation-based aquatic life criteria for sulfate. Dr. David Soucek, Ph.D. with the Illinois Natural History Survey, is the primary investigator in the research that developed the proposed equation-based sulfate criteria. Dr. Soucek and other leading researchers cautioned that the test conditions used in the toxicity tests may not be applicable to all of the Commonwealth's waters. The ionic composition of the test water compared to the natural ionic composition of Pennsylvania's waters differs and that difference is the cause for concern. Sodium ( $\text{Na}^{2+}$ ) was the dominant cation associated with the sulfate ( $\text{SO}_4^{2-}$ ) anion under the test conditions. In Pennsylvania streams natural Sodium ( $\text{Na}^{2+}$ ) concentrations are low while calcium ( $\text{Ca}^{2+}$ ) and Magnesium ( $\text{Mg}^{2+}$ ) are more prevalent.

It has been demonstrated that varying the cations affects the toxicity of the sulfate anion in solution. This difference in ionic composition leads to doubts regarding whether this sulfate criteria provides the appropriate level of aquatic life protection from the toxic effects that have been scientifically proven to be associated with elevated sulfate levels. Additionally, Dr. Soucek and other researchers stated that a chronic standard is needed to adequately protect the aquatic life and the proposed standard only includes an acute standard.

During the development of state or tribal water quality standards, it is atypical for the promulgating body to actually conduct the toxicological research that results in the final numeric criteria. It is not reasonable to expect states and tribes to be able to afford the funding necessary to conduct or repeat toxicological research of sulfate (or any other chemical) to the same scale and degree of technical expertise and detailed analysis as was done by Illinois and cooperating agencies. During the development of water quality standards, states and tribes can and often do rely on valid toxicological studies that have been peer-reviewed and published in scientific journals. Criteria that have been developed by other states and tribes can generally be applied elsewhere; however these equation-based criteria which were promulgated by Illinois may not be completely appropriate in Pennsylvania waters because of the differences in the ionic matrices between laboratory conditions and naturally occurring conditions found throughout Pennsylvania.

The Department is recommending the Board withdraw the current sulfate proposals but will continue to monitor the quantities discharged from various sources and measure stream concentrations while reviewing the developing science on sulfate.

**39.) Comment:** Oppose the inclusion of sulfate in the triennial review until a need is demonstrated. **(1, 3, 9, 12, 13, 18, 19, 24)**

PA DEP has failed to document any pressing threat to aquatic life or human health that justifies need for statewide criteria for Sulfate. **(3, 12, 19, 20)**

To our knowledge, PA DEP has not completed any correlated chemical sampling and analysis, biological surveys or acute and chronic bioassays to determine if a water quality standard for sulfate is actually needed. **(3, 12, 17)**

We take issue with the fact that PA DEP believes statewide aquatic life criteria for sulfates are necessary at this time. **(17)**

While U.S. EPA may be studying such a standard the question that must be asked is the reasons for DEP's push for such a standard in the Commonwealth at this time. **(16, 18)**

Additional PA-specific study is needed prior to proposing any new sulfate standard. **(20)**

We have reviewed PA DEP's existing chemical data found on their Southwest Regional Office website entitled, "Mon River TDS and Sulfate Sampling Results." It is our opinion that these data do not support a rationale for imposing a statewide sulfate water quality standard for the protection of aquatic life. **(17)**

**Response:**

The Department does not acknowledge a lack of need for aquatic life protection from the effects of sulfate. The Department is recommending the Board withdraw the proposed sulfate criteria, but will continue to monitor the quantities discharged from various sources and measure stream concentrations while reviewing the developing science on sulfate.

**40.) Comment:** There are no national water quality standard/criteria for sulfates which are designated to be protective of aquatic life. **(3, 9, 17, 18, 19)**

**Response:** That is correct. The Department does acknowledge that there is not a federally recommended criterion designed to be protective of aquatic life from the effects of sulfate. Under section 303 of the Clean Water Act, states – not the federal government – are required to develop water quality standards.

**41.) Comment:** None of Pennsylvania's surrounding states, Kentucky, Maryland, New York, Ohio, Virginia, or West Virginia, have established aquatic life criteria for sulfate, let alone the recommendation to adopt criteria developed for a Midwestern state, Illinois, and think that those criteria are directly applicable to Pennsylvania, an Eastern Appalachian state. **(17)**

**Response:** New Jersey is contiguous with Pennsylvania on the eastern border, separated by the Delaware River. New Jersey has a water quality standard for sulfate equal to 250 mg/l that is applicable in FW2 waters and this sulfate standard includes protection for aquatic life. The FW1 waters of New Jersey are intended to be set aside for posterity in their natural state and are not to be subjected to any wastewater discharges or increases in runoff from human activities. This sulfate standard is applicable in all of New Jersey's remaining waters that are categorized as FW2 (excludes FW1 and Pinelands Waters).

During the development of water quality standards, states and tribes can and often do rely on valid toxicological studies that have been peer-reviewed and published in scientific journals. Criteria that have been developed by other states and tribes can generally be applied elsewhere because the research is almost always conducted in a controlled laboratory environment and the natural conditions that occur locally do not apply; however, despite the fact that the research is very good, these equation-based criteria which were promulgated by Illinois may not be completely

appropriate in all Pennsylvania waters because of the differences in the ionic matrices between laboratory conditions and naturally occurring conditions found throughout Pennsylvania.

**42.) Comment:** Pennsylvania already has an established criterion for the protection of aquatic life from the impacts of sulfate, and Total Dissolved Solids for that matter, and that criterion is Osmotic Pressure. There is no question that PA DEP recognizes Osmotic Pressure as the most appropriate parameter for protecting aquatic life resources. **(17)**

New and additional aquatic life standards for sulfate are unnecessary because adequate protection of aquatic life and human health are provided from current Chapter 93 standards for human health and aquatic life (TDS, osmotic pressure) and Chapter 95 discharge standards for TDS. **(20)**

DEPs own chemical data alone fails to show a need for additional standards for sulfate. We have reviewed DEP's existing chemical data published on its Southwest Regional Office website (Mon River TDS Sulfate Sampling Results.) DEP already has the tools to protect aquatic life in receiving waters from excess salinity – those tools being Osmotic Pressure water quality standards of Chapter 93 and the TDS discharge standards of Chapter 95. **(3)**

DEP is proposing aquatic life standards for sulfate. The proposed sulfate standard is the lesser of 2,000 mg/L or the result of a calculated sulfate limit based on receiving stream hardness and chloride content. Our concern is that this parameter is a primary constituent of Total Dissolved Solids (TDS), which DEP discussed at-length with the regulated community during the Chapter 95 rulemaking process due to the substantive costs involved with TDS treatment and removal. **(1)**

Discharge of sulfates, which are a primary source of TDS, are already regulated under Chapter 95 that became effective on Aug. 21 2010. As a result, the rationale for the proposed sulfate rulemaking is flawed. **(21)**

The adoption of aquatic life criteria for sulfate is duplicative and unnecessary. **(17)**

**Response:** The "Green Book" (*Water Quality Criteria Report of the National Technical Advisory Committee to the Secretary of the Interior*. Federal Water Pollution Control Administration. April 1, 1968) on which the 50 milliosmole per kilogram Osmotic Pressure (OP) criterion is based, states: "If the dissolved materials **are relatively innocuous, having only an osmotic effect**, it is judged that the total dissolved materials in a water course may be increased to a certain extent but they should not exceed 50 milliosmoles if the fauna is to be maintained" (**emphasis added**). Toxicity testing has shown sulfate and chloride ions are not innocuous. OP is not sufficiently protective when certain individual ions (including chloride and sulfate) dominate the matrix and therefore criterion for individual ions is necessary in conjunction with the current OP criterion.

The current OP standard of 50 milliosmoles per kilogram is not overly protective given that most aquatic life cannot survive above this value. This aquatic life criterion remains important because OP pressure in and of itself will kill aquatic organisms.

The 25 Pa. Code 95.10 treatment requirements for point sources of TDS and certain component dissolved solids do not obviate the need for appropriate and comprehensive instream water quality criteria. Firstly, treatment requirements apply only to effluent, not to instream water quality. Instream concentrations of chloride or sulfate that are deleterious to aquatic life and human health

are not prevented by setting treatment requirements on certain point sources. The treatment requirements do not apply to all point sources, and do not address nonpoint sources. Secondly, the development of the §95.10 treatment requirements reinforces rather than replaces the need for appropriate and comprehensive instream water quality criteria for chloride and sulfate. There is broad recognition (40 Pa.B. 4835) of TDS and its component solids, including especially chloride and sulfate, as increasingly important pollutants of concern in Pennsylvania. While the §95.10 treatment requirements served to contain the TDS issue statewide, development of appropriate instream criteria is the logical next step in controlling these pollutants in specific water quality scenarios.

**43.) Comment:** Although we clearly understand that there was a concern at one time with potential water quality impacts from Marcellus Shale drilling operations, that industry is now maximizing recycling of its wastewater and therefore mitigating this potential threat. **(1)**

**Response:** There are other sources of sulfate besides Marcellus Shale drilling.

#### **Economic Comments Concerning Sulfate**

**44.) Comment:** Our collective concern (with the sulfate criteria) is based on the significant potential impacts to the Pennsylvania economy without any clear need or pressing threat to the aquatic environment. **(1)**

We believe sampling and analysis should have been completed given the differences in the ionic makeup of Illinois and PA's waters, the statewide impact to the regulated community and the economic costs associated with implementation. **(3)**

Sulfate standard would discourage or negate coal re-mining and reclamation opportunities. **(9)**

There is no national sulfate standard and therefore implementing the sulfate standard would impose a hindrance on Pennsylvanians' ability to do business on a level playing field. **(12)**

With respect to the new criteria for sulfate, the financial burden could be in the billions of dollars to industry. At a time when the economy... as a whole is performing poorly at best,..., it is questionable as to why PA DEP would propose new water quality criteria that they readily admit will adversely affect the economic well-being of the regulated community.

While a cost/benefit analysis is not part of the water quality criteria process, the establishment of new criteria, or overly protective criteria, does have a real and unavoidable financial impact on the regulated community. **(17)**

EPA's May 15, 2012 letter to the DEP re TR13: US EPA indicates that it is working on a national standard. Why is PA DEP taking unilateral action to establish a standard which will put Pennsylvania industries at a competitive disadvantage?

The coal mining industry in Illinois was granted site-specific relief for sulfate (reason was the lack of economically reasonable treatment technology). IL EPA recognized the significant cost to its coal mining industry and likewise, we recognize the cost to the PA coal mining industry. **(20)**

The information in the preamble regarding the costs and the maturity of the available technology (to remove sulfates) is wholly inaccurate. **(21)**

Oppose the proposed standards for sulfate as it will have considerable impacts upon the oil and gas industry. **(24)**

We are very concerned about the economic impact of sulfate criteria. There is no environmental benefit for most PA waters to offset the economic concerns. **(20)**

**Response:** The Department is recommending the Board withdraw the proposed sulfate criteria.

#### **Comments Concerning Sulfate Treatment Technique**

**45.) Comment:** The treatment technologies require various treatment steps in advance of the sulfate/TDS treatment process to remove materials that would foul or ruin the reverse osmosis and evaporation/crystallization units.

- It would involve extremely high energy usage.
- Cost of installation and maintenance
- By-products = large volumes of concentrated brine and salt cake waste (possibly hazardous)

The technology needed to remove sulfate has not been developed for use in [the electric power generation] industry's applications and is not in commercial use in the US at flows that are typical of electric generation plants in PA.

- a) Could include flue gas desulfurization (FGD) purge water
- b) Cooling tower blowdown
- c) Landfill leachate
- d) Demineralization regeneration water
- e) Ash pond effluent; coal pile runoff effluent
- f) Wetland mitigation water.

FGD ZLD Technology study (Aug 2009 to June 2010) - Conemaugh operates a wet FGD system WWTP. Five alternate methods were summarized and cost analysis given. **(20)**

**Response:** The Department is recommending the Board withdraw the proposed equation-based aquatic life criteria for sulfate.

#### ***Comments Concerning Temperature***

**46.) Comment:** It is reasonable to solicit sound science and qualified technical advice concerning temperature. Please adopt adequate measures based on current scientific and technical data. **(10)**

**Response:** Thank you for your comment.

**47.) Comment:** The existing rate of temperature change criterion (2°F during a 1-hour period) cannot even be met under naturally occurring conditions without any influence from a point source discharge. Several literature reviews do not support the existing standard. Since there is no

available basis for the temperature criterion, it is appropriate that the Department review the limit. **(20, 21)**

**Response:** The rate of temperature change criterion (2°F during a 1-hour period) was derived specifically to apply to heated waste sources. 25 Pa Code §93.7 states that heated “wastes may not result in a change by more than 2°F during a 1-hour period.” For example, if the ambient water temperature changes by 3°F in one hour, a heated waste source can change the temperature by an additional 2°F, but no more. In this example, the aquatic organisms are experiencing a rate of temperature change of 5°F in one hour.

The commentator states that several literature reviews do not support the current criterion; however, these reviews were not submitted as part of the public comment to this rulemaking.

**48.) Comment:** In this triennial review, PADEP is reviewing the rate of temperature change provision in PA Code §93.7, Table 3. The public notice indicates that the EQB may consider changes to this provision in the final-form rulemaking based on comments received. EPA is wondering what opportunity will be available for public review should revisions be made to this provision. **(22)**

In order to give the regulated community and other interested parties an opportunity to provide input on changes the Board makes as a result of this request for input, we recommend that the Board publish an Advanced Notice of Final Rulemaking (ANFR). An ANFR would provide the opportunity to review and resolve remaining issues before submittal of a final-form regulation. **(197)**

**Response:** In the final rulemaking, the 2° F rate of temperature change provision is deleted from § 93.7. The Department continues to be interested in evaluating new science that pertains to a rate of temperature change to protect aquatic organisms.

**49.) Comment:** We request that the May 2009 report, *Evaluating the Seasonal Effects of Short-term Temperature Fluctuations on Macroinvertebrate and Fish in the Susquehanna River near the Brunner Island Steam Electric Station* (Stroud Water Research Center. 2009), be considered by the DEP in its evaluation of a revised temperature criterion. **(20, 21)**

**Response:** The Department has reviewed the 2009 Stroud report and determined that although it is good and sound science, there is not enough information to determine a new criterion. This original Stroud study did not evaluate the effect of rate of temperature change on aquatic organisms in temperatures above 82°F. Since the temperature criteria for Warm Water Fishes exceeds 82°F in the summer months (up to 87°F), natural conditions also frequently exceed 82°F, and many aquatic organisms’ thermal thresholds are above 82°F, the Department contracted with Stroud to expand this original study to consider these conditions. The document is currently under review by the Department.

### ***Comments Concerning Chromium III***

#### **Supportive Comment on Chromium III**

**50.) Comment:** We support the addition of the chromium III conversion factors to Chapter 93 criteria. **(7, 10)**

**Response:** The Department appreciates this comment.

### ***Comments Concerning Human Health Criteria for Toxic substances***

#### **Supportive Comment on all of the Human Health Criteria**

**51.) Comment:** I support the Board's proposal of criteria for the 13 toxic substances for the protection of human health uses. These improvements based on the best available scientific data and scientific judgments on pollutant concentrations and human health or aquatic life effects will adequately protect the Commonwealth's water quality. **(10)**

**Response:** The Department agrees and appreciates this comment.

#### **Comments Concerning Acrolein**

**52.) Comment:** We support the proposed acrolein criteria. **(7)**

**Response:** The Department appreciates this comment.

#### **Comments Concerning 2-Butoxyethanol**

**53.) Comment:** The new standard to 2-Butoxyethanol is a welcome addition. Some of our association members have been concerned about substances that are possibly discharged either intentionally or by accident from Marcellus Shale development, and what they mean to human health. **(15)**

I am especially supportive of the Board's proposal of 2-Butoxyethanol as it is related to the development of the Marcellus Shale Natural gas resource. **(10)**

**Response:** Thank you for your comments.

#### **General Comments Concerning 1,4-Dioxane**

**54.) Comment:** The commentator states a lack of need for the proposed criteria. (1.) DEP currently regulates with a site specific water quality criterion of 3 ug/L in Chapter 16 (2.) Insufficient support in the Preamble for either the need or the need for more stringent numbers. (3.) The commentator recommends first surveying the levels present in groundwater, drinking water, and surface water to determine if 1,4-Dioxane levels are concerning. **(20)**

**Response:** The Department is recommending the Board withdraw the proposed statewide 1,4-dioxane standard. Additionally, the Department will continue to develop site-specific criteria, as needed, using the best available science.

**55.) Comment:** There are no Federal standards or guidelines for either surface water or drinking water (DW) (so why PA?)

PA DEP was the only agency that recently proposed a human health statewide surface water criterion.

No other state that has recently considered USEPA's revised cancer slope for 1,4-dioxane has proposed to apply a human health criterion.

CA, NH, Conn, Maine, Mass, WHO have evaluated EPA's toxicological assessment of 1,4-Dioxane and concluded that DW criteria do not need to be as low as proposed by DEP, therefore further questioning DEP's low-ball proposal.

Recommend removal of 1,4-dioxane pending further study and evaluation of these concerns. **(20)**

**Response:** The Department is recommending the Board withdraw the proposed statewide 1,4-Dioxane standard. Additionally, the Department will continue to develop site-specific criteria, as needed, using the best available science.

The proposed water quality criterion was developed based on most recent scientific data available in the EPA agency-wide supported data system known as IRIS (Integrated Risk Information System). The Department recommends the Board withdraw the proposed statewide criterion. The Department will use the updated human health criterion of 0.35 µg/L, in the issuance of NPDES permits where the development of a site-specific criterion is warranted.

**56.) Comment:** The criterion is inconsistent (lower than) the World Health Organization (WHO), Agency for Toxic Substances and Disease Registry (ATSDR), Dr. Bruckner, USEPA's risk-based regional screening level concentration for drinking water.

Questions regarding Cancer Slope Factor - DEP used cancer slope factor in criteria development (1.) Use of linear dose extrapolation model is controversial (2.) Lacking evidence of carcinogenic properties of 1,4-dioxane (3.) Cancer slope factor used by DEP is excessively conservative (4.) deficient under the PA Data Quality Act (5.) deficient under the Regulatory Review Act. **(20)**

**Response:** In 2010, The Environmental Protection Agency's Integrated Risk Information System (IRIS) updated the cancer risk level for 1,4-dioxane.

The use of linear dose extrapolation was discussed in the EPA, Toxicological Review of 1,4-Dioxane. (EPA/635/R-09/005-F, August 2010) In this document some of the peer reviewers questioned the mode of action data supporting a linear extrapolation approach. EPA determined that the available information does not establish a plausible mode of action for 1,4-dioxane. The US EPA Guidelines for Carcinogenic Risk Assessment (US EPA, 2005, 086237) recommends that the method used to characterize and quantify cancer risk from a chemical is determined by what is known about the mode of action of the carcinogen and the shape of the cancer dose-response curve. The linear approach is recommended if the mode of action of carcinogenicity is not understood. In the case of 1,4-dioxane, the mode of carcinogenic action for peritoneal, mammary, nasal and liver tumors is unknown. Therefore, a linear low-dose extrapolation approach was used to estimate human



carcinogenic risk associated with 1,4-dioxane exposure. (Toxicological Review of 1,4-Dioxane, EPA/635/R-09/005-F, August 2010)

The Department believes that protecting the citizens of the Commonwealth, by utilizing the best scientifically available data to create the appropriate ambient water quality criteria will properly place the responsibility on the discharger to meet these standards when 1,4-dioxane is initially discharged, instead of on a person conducting cleanups after the fact.

**57.) Comment:** Lack of approved laboratory testing methods. **(20)**

**Response:** There are analytical methods in place to analyze 1,4-dioxane at the 0.35 ug/L risk level. In fact, several of these methods are capable of detecting 1,4-dioxane at levels below that of the proposed criterion. The Department has identified that test methodologies are available for all new or revised criteria being proposed in this rulemaking, and they are being incorporated into the Table 2A and 2B in Chapter 16, Appendix A. For 1,4-dioxane these approved methods are being added to Table 2B in the proposed revisions to Chapter 16.

#### **Economic Comments Concerning 1,4-Dioxane**

**58.) Comment:** There is a lack of feasible and cost-effective treatment. **(20)**

**Response:** The necessary technology to comply with the treatment of 1,4-dioxane is currently available. Some treatment technologies can be found in, *Treatment Technologies Available for 1,4-dioxane* (EPA. Dec 2006. EPA-542-R-06-009).

**59.) Comment:** We criticize DEP as failing to evaluate impacts of proposed criterion. This criterion may affect many stakeholders. Substance is ubiquitous with a wide variety of uses. It is a constituent of concern at some hazardous waste sites. **(20)**

**Response:** The criterion will only affect facilities that are issued NPDES permits based on the expected or known concentration of 1,4-dioxane in the discharge or persons conducting cleanups. By imposing monitor and report requirements on dischargers suspected or known to have 1,4-dioxane, the Department can determine where specific effluent limitations are warranted.

**60.) Comment:** We are very concerned about the economic impact of 1,4-Dioxane. **(20)**

**Response:** We acknowledge your concern.

#### **General Comments Opposing Molybdenum**

**61.) Comment:** The proposed criteria were developed because of a request from one regional office for only one or two dischargers. **(1, 20)**

Oppose the inclusion of molybdenum in the triennial review, until a need is demonstrated. **(1, 3, 6, 9, 12, 16, 18, 19, 20)**

In an attachment to the December 7, 2011 letter to members of WRAC and Secretary Krancer, Dr. Gary G. Van Riper (participant in the activities of the International Molybdenum Association, health safety and environmental committee), concluded that “in-stream background concentrations of molybdenum are such that molybdenum is actually not a concern in PA”, based on his review of the available information. **(3)**

There have been no new scientific studies which would justify imposing a water quality standard for molybdenum and the Department has offered no evidence that molybdenum is a problem in the Commonwealth waters. **(3, 4, 12, 17, 19, 20, 23)**

There have been no studies which include chemical sampling and analysis, biological surveys or bioassays for molybdenum. **(3, 12, 20)**

DEPs own chemical data alone fails to show a need for additional standards for molybdenum. Additionally, there is no data regarding molybdenum. **(3, 4)**

Statewide monitoring data reveals that molybdenum was rarely present at levels which exceed the proposed water quality standards for molybdenum and exceedances that did occur were almost exclusively in one location. Same data also contradicts the claim that current and historic mining activities are sources of a statewide molybdenum problem. **(3, 20, 23)**

DEP has failed to document an immediate threat to human health [or aquatic life] that would justify the need for establishing a molybdenum criterion at this time. **(3, 4, 12, 17, 19)**

The EQB has not supplied enough information to adequately refute the commentators’ assertions that a statewide criterion for molybdenum is not needed. **(4)**

Does PA DEP have specific scientifically valid evidence through chemical analysis, that molybdenum is present in certain types of industrial effluents, or are they only acknowledging the possibility as the choice of the verb “may” connotes? **(17)**

**Response:** The Department is recommending the Board withdraw the proposed statewide Molybdenum criteria while the Department continues to evaluate the extent of the need for statewide versus site-specific criteria. By imposing monitor and report requirements on dischargers suspected or known to have molybdenum, the Department can determine where specific effluent limitations are warranted. The Department will continue to develop site-specific criteria, as needed, using the best available science.

**62.) Comment:** Molybdenum is not a toxic substance. **(4)**

**Response:** The Department considers molybdenum to be a toxic substance. A “toxic substance”, as defined in Chapter 93 is, “a chemical or compound in sufficient quantity or concentration which is, or may become, harmful to human, animal or plant life.” Although molybdenum is considered an essential micronutrient, it is also toxic at excessive concentrations. According to the Merck manuals (a series of healthcare books for medical professionals), all trace minerals are toxic at high levels.

Molybdenum was proposed as a water quality based criterion to protect human health including pregnant women (fetus), infants and children. These groups have been identified as the most sensitive to the effects of molybdenum. Based upon available research, the USDA has established a Recommended Dietary Allowance (RDA) of 17 µg/day for children (age 1-3). The tolerable upper intake level is 0.3 mg/day for children in this age group (age 1-3). Values for infants and children were extrapolated from the adult values on the basis of body weight. The Adequate Intake values for infants are significantly lower at 2-3 µg/day. These values were based upon examination of the molybdenum content of human breast milk.

There are several other states that have adopted statewide human health criteria for molybdenum. (Ohio – 120 ug/L, North Carolina – 160 ug/L and Michigan – 120 ug/L)

In addition, EPA has added molybdenum to the Drinking Water Contaminant Candidate List (CCL3), based on the contaminant's potential to occur in public water systems and the potential for public health concern. (Federal Register: October 8, 2009 (Volume 74, Number 194))[Page 51850-51862]

**63.) Comment:** There is no drinking water standard or federal water quality standard for molybdenum and molybdenum is non-carcinogenic. **(1, 4, 12, 20, 21)**

**Response:** EPA has added molybdenum to the Drinking Water Contaminant Candidate List (CCL3), based on the contaminants potential to occur in public water systems and the potential for public health concern. (Federal Register: October 8, 2009 (Volume 74, Number 194))[Page 51850-51862] Although the federal government may recommend water quality standards, the federal Clean Water Act places the responsibility on states to develop the standards. Molybdenum is not a carcinogen, but it is a teratogen, which is a toxic characteristic.

### **Specific Human Health Molybdenum Comments**

**64.) Comment:** DEP's reference to the Dietary Reference Intake publication is not appropriate or intended. The purpose of the study was to establish Recommended Daily Allowances and Tolerable Upper Intake Levels. It was not intended to establish either drinking water standards or water quality standards. **(20)**

**Response:** The Department develops criteria in accordance with policies found in 25 Pa Code Chapter 16 (Water Quality Toxics management Strategy – Statement of Policy), and more specifically in the case for molybdenum, in accordance with § 16.32 (relating to guidelines for developing human health criteria for threshold level toxic effects).

The Department has calculated a threshold human health criterion for molybdenum based on the most current peer-reviewed, published scientific information and data including, but not limited to, the National Academies of Science (NAS) publication by the Institute of Medicine (IOM), *"Dietary Reference Intakes for Vitamin A ... Molybdenum ... 2000*, which supplements scientific information and data currently found in IRIS. The NAS publication includes an independent scientific study published by Fungwe et al. which examined the critical endpoints of gestation and fetal development. The Fungwe study was not conducted for the purpose of establishing nutritional guidelines as has been repeatedly suggested. This toxicity study has undergone peer-review and

publication in a scientific journal, and it has been repeatedly utilized and referenced by other researchers in various scientific fields. Furthermore, Langeloth Metallurgical Co. requested that the Department obtain the study from the Institute of Medicine for consideration in the development of a criterion. Use of this study was also recommended and approved by US EPA.

**65.) Comment:** Refute DEP's interpretation of ATSDR 2010 that the molybdenum-sensitive population includes those lacking dietary copper. The argument is that ATSDR 2010 evaluated potential copper metabolism interference from high molybdenum with ruminants and that ATSDR clearly stated that this issue is unique to ruminating animals and is not expected to a significant degree in humans. **(20)**

**Response:** The Department believes it has accurately interpreted the ATSDR public health assessment for Lincoln Park/Cotter Uranium Mill Superfund Site. Molybdenum is known to interfere with copper metabolism in ruminant animals (particularly in cattle) when dietary sulfur is high due to the formation of thiomolybdates. The report states "this interaction between thiomolybdates and copper is not expected to occur to a significant degree in humans." The Department does not disagree with this conclusion. Human physiology differs from ruminants such that the production of thiomolybdates in the presence of high dietary molybdenum and sulfur is not expected to occur. However, that conclusion does not imply that copper/molybdenum interactions do not occur in non-ruminant animals. In fact, the report goes on to state that "although the exact effect of molybdenum intake on copper status in humans remains to be clearly established, individuals who do not take in enough dietary copper or cannot process it correctly could be at increased risk of molybdenum toxicity [FNB 2001.]" This information was cited from the Dietary Reference Intake publication (Food and Nutrition Board, Institute of Medicine) and is supported by various research on non-ruminant animals including work by Suttle and an EPA report entitled Human Health Effects of Molybdenum in Drinking Water (EPA, 1979). Sensitive populations may include those individuals with any disease or condition which impairs copper absorption and/or metabolism including, but not limited to, Menke's Disease, celiac disease, Crohn's disease and bariatric surgery patients.

In addition, the statewide protected uses listed in Chapter 93 include a Livestock Water Supply (LWS) use. As cattle have been shown to be highly sensitive to molybdenum, especially in the presence of elevated sulfates, any criteria established should protect this statewide use.

**66.) Comment:** Molybdenum is recognized as an essential micro-nutrient necessary for the proper development of humans, plants and animals and is present in milk, dried beans, peas etc. **(4)**

**Response:** The Department agrees.

**67.) Comment:** The proposed human health standard for molybdenum of 210 ug/L is not a new proposal. It was approved by the EQB, but was disapproved by the Independent Regulatory Review Commission (IRRC). Since 2008, no new studies have been done on the effects of molybdenum on humans in this country or elsewhere, which support a standard of 0.210 mg/L. Therefore the Department is attempting to justify, in 2012, the very same proposal it was unable to justify to IRRC in 2008. **(1, 4, 17, 20)**

**Response:** The Department is recommending the Board withdraw the proposed statewide Molybdenum criteria while the Department continues to evaluate the extent of the need for statewide versus site-specific criteria. By imposing monitor and report requirements on dischargers

suspected or known to have molybdenum, the Department can determine where site-specific effluent limitations are warranted.

The Department will continue to develop site-specific criteria, as needed, using the best available science.

The Department believes the proposed statewide Molybdenum criteria is based on sound science and is applicable for use on a site specific basis. US EPA Headquarters staff reviewed and concurred that the Department used the appropriate data, and methodologies to develop the proposed recommended criterion for molybdenum.

**68.) Comment:** The proposed values are at variance with the most recent scientific data, where recent peer-reviewed and additional ongoing studies suggest that the numbers derived from the early studies cited are not well justified. **(23)**

DEP used bad data. Data upon which DEP's proposal is based is dated. Some other more recent data indicating "effects" observations cited could not be replicated. **(20, 23)**

More recent studies performed in the US in accordance with strict OECD toxicity study guidelines, were unable to replicate the Fungwe findings. **(20, 23)**

The proposed human health criterion is based on a single study (Fungwe 1990) of female rats, and shows data is now subject to serious question as a result of subsequent studies. **(23)**

**Response:** Pending peer-review and publication in a scientific journal, the Department has received and provided a complimentary review of two recent studies from the International Molybdenum Association (IMOA.) The Department does not dispute that the studies contain valid data and were conducted by highly qualified professionals following sound scientific protocols. However, the recent studies, "Sodium Molybdate Dihydrate: A 90-day Oral Dietary Administration Study in Rats" completed by Huntingdon Life Sciences and the "Dose Range-Finding Study for the Developmental Toxicity Evaluation of Sodium Molybdate Dihydrate Administered in the Diet to CD (Sprague Dawley) Rats" completed by RTI International were not designed to replicate the 1990 Fungwe study. The Fungwe study dosed female rats prior to conception (54 days) and during the entire gestational period (avg. 20 days). The Huntingdon Life Sciences study did not examine gestation. The RTI study received pregnant rats from a vendor and did not begin dosing with molybdenum until gestational day 6 (GD 6), which is post implantation in Sprague Dawley rats. Thus, the study may have missed a sensitive critical period in development that was covered in the Fungwe study (GD1 to GD6). Fungwe also included a period of exposure prior to conception, which may or may not have contributed to the developmental issues identified in the study.

Furthermore, the molybdenum supplement in both IMOA studies was added to the feed of the test species, a factor that may have diminished absorption to a greater extent than the drinking water used as the vehicle by Fungwe et al., where rats were dosed through their drinking water, which provided molybdenum in addition to the normal expected amounts found in the diet. Several studies have suggested that there is nearly 100% absorption of the molybdenum administered in drinking water versus approximately 50-70% absorption when the molybdenum is administered with food.

According to Commentator #23, “based on Fungwe, one would have expected to see an increase in fetal resorptions, decreased fetal bodyweight and an increase in external malformations in the range-finding evaluations. But none of these effects were observed.” Fungwe observed that molybdenum supplemented up to 100 ppm did not affect growth, weight gain, or fertility but prolonged the estrous cycle, and affected internal fetal development. Fungwe noted “even though a higher resorption rate was observed with 10 mg Mo/L or more, litter size did not differ. A possible implication is that **molybdenum may have some effect as early as the implantation stage.** (Emphasis added). The few intrauterine deaths noted support this concept and suggest that the incidences of resorption began at some earlier stage of embryonic development and that once the embryo developed beyond that stage the effect was averted....Since more resorbed fetuses than dead ones were observed, it is logical to speculate that molybdenum may be directly or indirectly affecting fetal development at the embryonic cell and tissue differentiation stage.” The RTI study did not begin dosing the pregnant rats with molybdenum until GD 6, which is post-implantation in Sprague Dawley rats. It is plausible that increased resorptions were not noted in the RTI study because it did not include the implantation period.

Fungwe also did not observe increases in external malformations as suggested by the commentator. “Visual examination [of the fetuses], under the binocular dissecting microscope, did not reveal any physical or congenital abnormalities that could be attributed to the teratogenicity of molybdenum.” The developmental differences that were seen in the Fungwe study occurred in various internal body systems – most notably the liver, the esophagus, vertebra/spinal cord and abdominal musculature. According to Fungwe et al, “it is possible that the effects of molybdenum are at the cellular level and that young or developing cells are more susceptible.” Internal, microscopic examination of the fetal structures and body systems were not performed in the RTI study.

As previously stated, the Fungwe rats were dosed with molybdenum for 75 days including a 54-day preconception period as compared with only 15 days of dosing (post-implantation) in the RTI study. It is unclear how the difference in timing and dosing length may or may not have affected fetal weight gain, the number of resorption sites, internal organ development, etc. Once again, **the RTI study was not designed to replicate the Fungwe study.** Therefore, the results of these studies neither confirm nor discredit each other.

Another issue raised of the Fungwe study noted in Commentator #23’s Exhibit D states “Finally, the treatment of animals at a very early, susceptible stage with high doses of an essential trace element is likely to have disturbed the homeostasis [balance] of the other trace elements such as copper....” Treatment during a susceptible stage is a primary reason why the Fungwe study was selected. It examined the life stages and developmental periods most sensitive to the effects of molybdenum whether due to a direct effect on cell activity or indirect effects such as altering the balance of other essential minerals.

### **Specific Economic Molybdenum Comments**

**69.) Comment:** We oppose the proposed standards for molybdenum as it would have considerable impacts upon the oil and gas industry. (24)

**Response:** The Department does not establish water quality criteria based on how they may or may not impact industry. Criteria development is based on the best available science and toxicological information. The Department is not aware of any data, and none has been provided by the commentator, that would suggest that the proposed molybdenum criterion would have a considerable impact upon the oil and gas industry.

**70.) Comment:** There is questionable evidence of its toxicity to humans, particularly in absence of commercially available and cost-effective means to reduce or eliminate this substance from existing and permitted industrial discharges. **(4)**

**Response:** See Comments 64, 65, and 68 above for responses related to the issue of toxicity. As for treatment technologies, a 1979 literature review conducted by EPA (EPA-600/1-79-006) found that several processes are effective at removing molybdenum from wastewater effluent, particularly iron co-precipitation combined with sand filtration or dissolved-air flotation and ion exchange systems. "Zander demonstrated that this technique could be used to remove molybdenum from industrial wastes streams. The process used involved the addition of ferric iron and subsequent dissolved-air flotation. Removal efficiencies of better than 99% were obtained. Typical molybdenum concentration in a treated effluent which initially contained 15,000 µg/L was 110 µg/L." "*Molybdenum Removal from Industrial Waste Streams using Dissolved-Air Flotation Ferric Iron Precipitates*" (Zander, B 1973).. Another facility using ion exchange reported a removal rate of 98%. The raw wastewater contained 6,000 µg/L molybdenum."

Another paper, *Molybdenum Treatment at Brenda Mines* (Bernard C. Aube and John Stroiazzo, 2000) evaluated the use of molybdenum removal technologies at Brenda Mines in British Columbia, Canada. This facility successfully used iron co-precipitation combined with sand filtration to consistently reduce raw wastewater concentrations of molybdenum from 3 mg/L to less than 0.05 mg/L.

**71.) Comment:** The Secretary of the PADEP has on numerous occasions made the statement that PA should not impose environmental regulatory standards which are not otherwise required by Federal law or regulation unless there is a clear need to protect a unique PA interest. **(4, 12)**

**Response:** The unique Pennsylvania interest is the protection of statewide water uses, including human health, aquatic life and livestock water supplies.

**72.) Comment:** While a cost/benefit analysis is not part of the water quality criteria process, the establishment of new criteria, or overly protective criteria, do have a real and unavoidable financial impact on the regulated community. It is questionable as to why PA DEP would propose new water quality criteria that they readily admit will adversely affect the economic well-being of the regulated community. **(17, 20)**

**Response:** The Department is recommending the Board withdraw the proposed statewide molybdenum criteria.

### **General Comments Concerning Resorcinol**

**73.) Comment:** The Department's human health-based ambient water quality criterion is not consistent with Chapter 16 regulations entitled Guidelines for development of human health-based criteria. **(14)**

**Response:** The resorcinol criterion was developed based on the provisions in 25 PA Code §16.32 (relating to threshold level toxic effects).

**74.) Comment:** The Department's human health-based ambient water quality criterion for resorcinol is not based upon the best available data or science. **(14)**

**Response:** The Department uses the best available data and science in the development of all criteria. Please refer to the criteria development rationale document for a description of the data and methodologies used to develop the resorcinol criterion for human health protection.

**75.) Comment:** The Department's lab accreditation requirement may make it impossible to demonstrate attainment of the proposed ambient water quality criterion. **(14)**

**Response:** There are currently approved methods available for the analysis of resorcinol. No DEP laboratory approval is needed if an EPA approved analytical method is used for the analysis of resorcinol. Analytical method requirements are listed as part of most NPDES permits.

#### **General Comments Concerning Strontium**

**76.) Comment:** We are very supportive of all the improvements noted in this rulemaking especially strontium. We need to know when such a pollutant is the result of a discharge from a drilling site, or when it might be naturally occurring. **(15)**

I am especially supportive of the Board's proposal of Strontium as it is related to the development of the Marcellus Shale Natural gas resource. **(10)**

**Response:** Thank you for your supportive comments.

**77.) Comment:** We take issue with the fact that PA DEP believes a statewide human health criterion for strontium is necessary at this time. As previously noted under the chloride criteria discussion, flow back water may (emphasis added) contain strontium, and in Pennsylvania, the oil and gas industry operates in a zero discharge mode thus achieving protection of the freshwaters of the Commonwealth through a best management practices approach. This would seem to negate the need for strontium water quality criterion based on the assumption that oil and gas industry fluids will be discharged to nearby surface waters.

Clearly, in the very limited text of the proposed rulemaking and the supporting rationale document, PA DEP offers no real evidence for the presence of strontium in Pennsylvania's streams and waterways, and concomitantly, there is no demonstrated risk to human health, or the environment for that matter. PA DEP is seemingly using a haphazard approach to adding parameters to the triennial review without sufficient scientific data to justify such an action. **(17)**



**Response:** Strontium has been identified in many hazardous waste sites that have been proposed for inclusion on the EPA Superfund National Priorities List (NPL) (HazDat 2003). Strontium is a naturally occurring metal and can enter the waterways in a variety of forms and sources. It can be released to surface water and groundwater as a result of the natural weathering of rocks and soils and from the discharge of wastewater directly into streams and aquifers. Strontium is used in ceramics and glass products; pyrotechnics; paint pigments and fluorescent lights to name a few (ATSDR Toxicological profile for strontium).

There are at least 10 facilities in Pennsylvania that are required by the Department to monitor and report, and in some cases limit the strontium concentrations in their discharge. Some of the concentrations being reported exceed 300 mg/L. The ambient water quality criterion proposed by the Board will protect human health and will match the current Federal strontium health advisory for drinking water.

### ***Comments Concerning Aquatic Life Criteria for Toxic substances***

#### **Specific Aquatic Life Comments for Acrolein**

**78.) Comment:** We support the proposed acrolein criteria. **(7)**

**Response:** Thank you for your supportive comment.

#### **Specific Aquatic Life Comments for the Sulfonic Acids**

**79.) Comment:** The criteria for benzene metasulfonic acid, benzene monosulfonic acid and p-phenol sulfonic acid vary slightly from those proposed by AMEC. The differences are apparently due to rounding and do not exceed 4.1%. We do not object to this change, but we suggest that the differences between proposed criteria and those in the AMEC (2008) document be described, since this is the sole document upon which criteria are said to be based. **(7)**

**Response:** Thank you for your comment. To promote consistency in our criteria development, during our 2000 Triennial Review of Water Quality Standards, the Department agreed to round all newly developed criteria to two significant figures.

**80.) Comment:** Please include in the rationale documents for the development of aquatic life criteria for the sulfonic acid toxicity data used to calculate the criteria, ranked by the genus mean acute values. **(22)**

**Response:** Thank you for your comment. The Department has provided the requested toxicity data to the commentator

#### **Specific Aquatic Life Comments for Molybdenum**

**81.) Comment:** We believe that the proposed chronic molybdenum water quality criterion of 1900 ug/L is not adequately protective of aquatic life.

Tetra Tech's analysis supported a Nevada chronic water quality criterion of 1.65 mg/L. A sensitive test organism, white sucker, *Catostomus commersonii*, is very common in PA waters. Northern pike, *Esox Lucius*, had similar sensitivity. Based on this information, our agency recommends adoption of a 1650 ug/L chronic water quality criterion as proposed by Tetra Tech Inc. (2008) and subsequently adopted by the state of Nevada to protect sensitive fish. (7)

**Response:** The Department carefully reviewed, along with US EPA, all aquatic life data that was available in determining the toxicity of molybdenum to aquatic organisms. Molybdenum occurs in several different forms. Molybdenum does not occur as the free metal in nature, but rather in a variety of oxidation states in minerals. The most prevalent form found in PA waters is the molybdate ion  $\text{MoO}_4$ . In aquatic environments the molybdate ion is the most abundant form when the in-stream pH is  $>5$ , and  $\text{MoO}_2^+$  and  $\text{MoO}_3^+$  is more prevalent at a pH of  $<5$ . It is rare to find a stream with a pH of 5 in PA. (Pyle 2000) Therefore the toxicity data used to calculate the Mo criterion was based on studies using the molybdate test solution.

Because  $\text{MoO}_2^+$  and  $\text{MoO}_3^+$  only occur in waters with a low pH, the Department excluded studies in which these compounds were used as the test substance. The studies indicating a low molybdenum toxicity for white suckers and Northern pike were excluded because the test solution used was  $\text{MoO}_2^+$  and  $\text{MoO}_3^+$ , and is not representative of PA waters.

**82.) Comment:** DEP has failed to document an immediate threat to [human health or] aquatic life that would justify the need for establishing a molybdenum criterion at this time. (3, 4, 12, 17, 19)

**Response:** The Department is recommending the Board withdraw the proposed statewide Molybdenum criteria. Monitor and report requirements will be imposed on dischargers suspected or known to have molybdenum so the Department can determine where specific effluent limitations are warranted.

The Department continues to develop site-specific criteria as needed using the best available science.

**83.) Comment:** The Tetra Tech, Inc., (2008) report that provided the basis for the Nevada water quality criteria, was incorrectly cited in the background Pennsylvania Bulletin documentation as "2009" publication. (7)

**Response:** Thank you for your comment. This citation will be correctly referenced in this rulemaking documentation.

**84.) Comment:** We also note that amphibians may have low molybdenum tolerance and additional toxicity work is desirable to define an appropriate level of protection. (7)

**Response:** The Department establishes criteria for toxic substances in accordance with the EPA, "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses" (1985). This guidance document requires that data for at least one species of freshwater animal in at least eight different families from specific classes or phylum be used to calculate the aquatic life criteria. Amphibians are in the phylum, Chordata. The Department included two data sets from the phylum Chordata, class Amphibia, which includes the amphibians.

The four most sensitive species from the eight families are then used in the derivation of the criteria. (EPA Guidelines, 1985) Upon final ranking of the organisms according to toxicity, the amphibians were in ninth and tenth place. The data currently available does not project amphibians as being one of the most sensitive aquatic organisms. The calculated molybdenum criterion would therefore protect amphibians as well as more sensitive species.

**85.) Comment:** Recently published studies on the effects of molybdenum on aquatic life confirm that the chronic standard proposed by the Commonwealth of 1.9 mg/L is far too low.

The proposed statewide aquatic water quality standards for molybdenum were based on a study done several years ago for the State of Nevada. (Tetra Tech Inc. 2008) New, high quality, scientific data on the aquatic effects of molybdenum has been generated, which were not carefully, if at all, reviewed by the Department before submitting the proposed standards for adoption.

The Department should withdraw its current proposal to establish statewide aquatic life molybdenum standards and undertake a thorough review both of Tetra Tech's more recent work, and the data which Tetra Tech reviewed before submitting any proposal. **(4)**

DEP's proposed molybdenum aquatic life standards are premature and should be withdrawn. **(20)**

**Response:** Thank you for your comment. While the Department is no longer recommending a statewide criterion for molybdenum, the proposed criterion may be used in the issuance of NPDES permits where the development of a site-specific criterion is warranted. The proposed criterion is based on sound science.

**86.) Comment:** The derivation of a proposed chronic standard is based solely on the proposed acute value and application of an acute-to-chronic ratio, ignores the substantial body of chronic effects data now available in the peer-reviewed literature. **(23)**

**Response:** The Department uses the, *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, (1985) to develop aquatic life criteria. These guidelines require chronic data from eight specified aquatic families to be used to create a protective chronic criterion. If there are no data to represent the eight families, an acute to chronic ratio (ACR) is used to calculate the protective chronic value.

The Department thoroughly reviewed two chronic studies, prepared for the International Molybdenum Association (IMO): *Freshwater effects assessment of molybdenum: data evaluation and PNEC-derivation* (Heijerick, 2008); *The chronic toxicity of molybdate to freshwater organisms. I. Generating reliable effects data* (De Schampelaere, 2010) and *The toxicity of molybdate to freshwater and marine organisms. II. Effects assessment of molybdate in the aquatic environment under REACH* (Heijerick, 2012.) These were two very good studies, but they lacked the eight biological families required to fully calculate a chronic water quality criterion for molybdenum. Therefore, they were not used in the calculation to determine the chronic criterion for molybdenum.

**87.) Comment:** Currently, U.S. EPA has not developed or published national acute or chronic criteria for molybdenum for the protection of aquatic life. This is most likely due to the relative low toxicity and rare occurrence of molybdenum in most areas of the United States. **(17)**

**Response:** The Department has had on-going consultation with US EPA on the toxicity data available and the appropriate use of the sources the Department used to obtain toxics data for calculating the proposed aquatic life ambient water quality criteria. The Department develops criteria for pollutants that are not currently listed in the Pa Code, Chapter 93 regulations. States develop standards independent of the US EPA since many pollutants are found to occur more dominantly in regions of the country and not nationwide. There are also other states that have molybdenum criteria in their standards, even though a national criterion has not been established.

**88.) Comment:** The proposed aquatic life standards for molybdenum are based on a study performed in 2008 by Tetra Tech for the state of Nevada (Tetra Tech 2008.) Since that report, a more recent aquatic life impact study of molybdenum (D.H. Heijerick, et al 2008) was published. The aquatic life criteria in the more recent Heijerick 2008 study were less restrictive than those reflected in the Tetra Tech 2008 study. The principal author of Tetra Tech 2008, Mr. Henry Latimer, reviewed Heijerick 2008 and concluded that the data provided in that report filled and completed data gaps that existed at the time of Tetra Tech 2008, and that the criteria of Heijerick 2008 would be the more appropriate criteria. Based on the lack of water quality impairment and that the proposed standard is based on a request from one regional office, the additional time for a more thorough sound scientific evaluation is very appropriate. **(1, 3, 20, 23)**

**Response:** The Department thoroughly reviewed two chronic studies prepared for the International Molybdenum Association (IMO): *Freshwater effects assessment of molybdenum: data evaluation and PNEC-derivation* (Heijerick, 2008); *The chronic toxicity of molybdate to freshwater organisms. I. Generating reliable effects data* (De Schampelaere, 2010) and *The toxicity of molybdate to freshwater and marine organisms. II. Effects assessment of molybdate in the aquatic environment under REACH* (Heijerick, 2012.) These were two very good studies, but they lacked the eight biological families required to fully calculate a chronic water quality criterion for molybdenum. Therefore, they were not used in the calculation to determine the chronic criterion for molybdenum. It should be noted that there are dischargers throughout the state that are known to discharge molybdenum.

#### **Specific Aquatic Life Comments for Nonylphenol**

**89.) Comment:** We support the nonylphenol criteria. **(7)**

**Response:** The Department appreciates this supportive comment.

#### **Specific Aquatic Life Comments for Resorcinol**

**90.) Comment:** Please include in the rationale documents for the development of aquatic life criteria for the resorcinol toxicity data used to calculate the criteria, ranked by the genus mean acute values. **(22)**

**Response:** Thank you for your comment. The Department has provided the requested toxicity data to the commentator, and added to the rationale documents.

### **Specific Comments Concerning Updating References from Chapter 92 to Chapter 92a (§93.8d)**

**91.) Comment:** Please publish this information in order that the public has adequate notice and knowledge to participate in the process. **(10)**

**Response:** Thank you for your comment. The Department does publish notice of these site-specific criteria. The regulatory amendment is simply updating the cross reference to the present process of public notices for site-specific criteria development now found in 25 Pa Code, Chapter 92a.

### ***Comments Concerning Corrections to Drainage Lists***

The Board has recommended a number of changes to §93.9 A to Z (Drainage Lists). These changes were described in the Preamble and it was also noted that these changes did not affect the current designated use of any streams. These changes should be considered as merely corrections and clarifications. Two commentators **(7, 22)** have noted where the Board's intentions need further elaboration and the information provided by one commentator **(7)** has resulted in additional corrections to List K. These comments are addressed below.

### **Overall supportive comment**

**92.) Comment:** It is warranted that the corrections and clarifications be properly recorded. Please publish accordingly. **(10)**

**Response:** Thank you for your comment. These corrections and clarifications were published as part of the proposed rulemaking to this triennial review of water quality standards.

### **Drainage List B**

**93.) Comment:** Indian Orchard Brook and Holbert Creek (both are tributaries to the Lackawaxen River) need to be listed within Section 93.b. We have forwarded to DEP the necessary information to support this recommendation. **(7)**

**Response:** Holbert Creek and Indian Orchard Brook are currently designated HQ-CWF, MF. Upon publication of this final rulemaking, they will both be included under the entry for tributaries (basins of tributaries) to Lackawaxen River between Dyberry Creek and Wallenpaupack Creek. They were previously included under the current entry for UNTs to Lackawaxen River; Basins, confluence of West Branch Lackawaxen River and Dyberry Creek to Mouth; Wayne; HQ-CWF, MF; None.

In 1973, the entire Lackawaxen River basin including Holbert Creek and Indian Orchard Brook was granted conservation area status (3.5) and Holbert Creek and Indian Orchard Brook were designated Cold Water Fishes (1.1) in this rulemaking; effective 15 days following publication in the May 28,

1973 *Pennsylvania Bulletin* (3 Pa.B. 986). The associated proposed rulemaking was published February 10, 1973 (3 Pa.B. 287).

The entire basin was converted to HQ in the 1978 and 1979 rulemaking (published as final rule at September 8, 1979 (9 Pa.B. 3051) and effective final on October 8, 1979) because it was formerly a conservation area.

The format used to specify entries in Chapter 93 for situations where a mainstem and its tributaries had different designated uses changed significantly with the 1978 and 1979 rulemaking. Prior to the 1978 and 1979 rulemaking, groups of tributaries with the same designation were lumped together with the same entry regardless of whether they were named. This late 1970's rulemaking grouped unnamed tributaries together and those that were named were all intended to have their own individual entries. The Department now recognizes that many streams that were included under entries for unnamed tributaries are actually named. Either the Department was not aware that the stream had its own name at the time of this rulemaking or the stream has become officially named since the 1978 and 1979 rulemaking.

The triennial review of water quality standards (as proposed January 12, 2008 (38 Pa.B. 236, 248) and effective as final on May 16, 2009 (39 Pa.B. 2523, 2543)) added the migratory fishes designation to the Atlantic slope drainage, including the Lackawaxen River Basin.

The correction for Drainage List B eliminates the confusion associated with named tributaries (e.g. Indian Orchard Brook and Holbert Creek) that were included under a previous listing for "unnamed tributaries". This correction also updates the name of the mainstem between Van Auken Creek and Dyberry Creek. The NHD Flowline now lists this section as Lackawaxen River. Formerly, the West Branch Lackawaxen River extended downstream to Dyberry Creek.

### **Drainage List C**

**94.) Comment:** It appears that the designated use for the Pocono Creek entry has been deleted and not replaced in the annex of the proposed rulemaking. Also, the entire basin of Wolf Swamp Run is currently designated EV. It is not clear that the stream segments currently designated as EV are maintaining the EV designation in the proposed changes. **(22)**

**Response:** The commentator incorrectly suggested that the changes to the Pocono Creek entry have the apparent effect of removing the designation without replacing it. This is a current conventional format used by the Department throughout Sections 93.9a to 93.9z where just the stream field is populated in a particular entry. This particular format denotes those situations where the confluence of two tributaries forms the origin of a stream with a different name.

The Department is recommending additional corrections to the headwaters of the Pocono Creek basin to be consistent with the National Hydrography Dataset (NHD) Flowline. The origin of Pocono Creek and the mouths of Wolf Swamp Run and Dry Sawmill Run are all now further downstream. So, there is now a portion of Wolf Swamp Run (formerly known as Pocono Creek) that extends downstream of the zone for exceptional value water. This stream segment from the point of confluence at 41° 3' 35.2" North; 75° 22' 2.4" West and the location that the NHD Flowline now

recognizes as the origin of Pocono Creek will maintain its current designated use (HQ-CWF, MF) even though it is now officially named as Wolf Swamp Run.

**95.) Comment:** Little Pocono Creek (tributary to Pocono Creek) needs to be listed within Section 93.9c. We have forwarded to DEP the necessary information to support this recommendation. **(7)**

**Response:** In 1972, McMichael Creek and tributaries from the source to and including Pocono Creek were granted conservation area status and Cold Water Fishes, as represented by water use symbols 3.5 and 1.1 respectively, in a rulemaking which became effective 15 days following publication in the February 26, 1972 *Pennsylvania Bulletin* (2 Pa.B. 341).

The entire Little Pocono Creek basin was converted to HQ-CWF in the 1978 and 1979 rulemaking because it was formerly a conservation area and cold water fishes. Little Pocono Creek basin was not listed correctly in Chapter 93.9c between 1979 and 1993. It was described as being a direct tributary to McMichael Creek, although it is actually a tributary to Pocono Creek.

The entry for Little Pocono Creek basin was deleted in 1993 along with the Sambo Creek, et al., Stream Redesignations Package (23 Pa.B. 2325). McMichael Creek was redesignated in this package. It appears as though the deletion for the Little Pocono Creek entry was intended to correct Drainage List C so that Little Pocono Creek would no longer be incorrectly described as a direct tributary to McMichael Creek. However, this introduced another problem. This most recent complication was that Little Pocono Creek was a named tributary to the Pocono Creek, but it was no longer listed individually in the Pa Code. The main stem of the Pocono Creek was designated independently of its tributaries, therefore, all of its tributaries should have been accounted for in Chapter 93.9, but now Little Pocono Creek is missing.

The triennial review of water quality standards (as proposed January 12, 2008 (38 Pa.B. 236, 248) and effective as final on May 16, 2009 (39 Pa.B. 2523, 2543)) added the migratory fishes designation to the Atlantic slope drainage, including the Delaware River Basin.

Little Pocono Creek is still designated HQ-CWF, MF and will be included in the newly created entry for the Pocono Creek basin beginning at the confluence of Dry Sawmill Run and Wolf Swamp Run and extending downstream to the mouth of Pocono Creek.

#### **Drainage List E**

**96.) Comment:** The designation for Mill Creek appears to be changed to WWF and should be CWF, unless the use change complies with the requirements for use change under the regulations at 40 C.F.R 131.10. **(22)**

**Response:** The Department is recommending stream name corrections to the Mill Creek basin to be consistent with the NHD Flowline. The origin of Mill Creek is now defined by the NHD Flowline as being the confluence of Lahaska Creek and Watson Creek. The waters that are now known as Lahaska Creek basin were formerly Mill Creek basin from the source to Watson Creek; and have always been and continue to be designated CWF, MF. The mouth of Lahaska Creek was previously recognized as being upstream of the mouth of Watson Creek. The portion of Mill Creek basin downstream of the mouth of Watson Creek (and now below the confluence of Watson Creek and

Lahaska Creek) was previously WWF, MF and continues to be so. No corrections are needed for Watson Creek basin.

### **Drainage List K**

**97.) Comment:** PA Fish and Boat Commission (PFBC) fisheries biologist surveyed 13 named tributaries to the North Branch Susquehanna River in sub-sub basin 05E during August and September 2011 as part of the PFBC statewide unassessed waters study. The majority of streams supported transitional fish communities and sport fish populations were limited. Wild trout were present in four streams but only two qualified for the PFBC list of stream sections that support natural reproduction of trout. Packers, Raups, Gaskins, and Kipps Runs are currently omitted from the listing of streams within Section 93.9k. We recently submitted to DEP the biological report which recommends the listing of these waterways as Cold Water Fishes and Migratory Fishes (CWF, MF) in the 25 PA Code Chapter 93 Water Quality Standards, Section 93.k. **(7)**

**Response:** The Department appreciates that the PFBC submitted comments during the official public comment period of this triennial review regarding a possible omission of four named streams from §93.9k. These four streams are Packers Run, Raups Run, Gaskins Run, and Kipps Run.

Gaskins Run, Kipps Run, Raups Run, and Packers Run are all currently designated CWF, MF because they are all included under the current entry for UNTs to Susquehanna River; Basins; Lackawanna River to West Branch Susquehanna River; Luzerne, Columbia, Montour, Northumberland; CWF, MF; None. To be even broader, all tributaries to the (North Branch) Susquehanna River between Mahoning Creek and the West Branch Susquehanna River are CWF, MF.

In 1973, all of the basins of the North Branch Susquehanna River Tributaries (except Harvey Creek, Shickshinny Creek, Nescopeck Creek, Fishing Creek, Catawissa Creek, Roaring Creek, and Mahoning Creek) from the mouth to, but not including Lackawanna River were designated Cold Water Fishes (1.1). This rulemaking was effective 15 days following publication in the May 26, 1973 *Pennsylvania Bulletin* (3 Pa.B. 986). The associated proposed rulemaking was published February 10, 1973 (3 Pa.B. 287).

The format used to specify entries in Chapter 93 for situations where a main stem and its tributaries had different designated uses changed significantly with the 1978 and 1979 rulemaking (published as final rule at September 8, 1979 (9 Pa.B. 3051) and effective final on October 8, 1979). Prior to the 1978 and 1979 rulemaking, groups of tributaries with the same designation were lumped together with the same entry regardless of whether or not they were named. This late 1970's rulemaking grouped unnamed tributaries together and those that were named were all intended to have their own individual entries. The Department now recognizes that many streams that were included under entries for unnamed tributaries are actually named. Either the Department was not aware that the stream had its own name at the time of this rulemaking or the stream has become officially named since this rulemaking. This 1979 rulemaking did not change the designations of any of these 4 tributaries, rather just the format.

Additionally, the 1978 and 1979 rulemaking added a specific entry for Wilson Run as though it were a tributary to the Susquehanna River. This is erroneous. Wilson Run is a tributary to Kipps Run which flows directly into the Susquehanna River.



The triennial review of water quality standards (as proposed January 12, 2008 (38 Pa.B. 236, 248) and effective as final on May 16, 2009 (39 Pa.B. 2523, 2543)) added the migratory fishes designation to the Atlantic slope drainage, including the Susquehanna River Basin.

To alleviate the confusion associated with this portion of §93.9k, it is recommended that all tributaries to the Susquehanna River between Mahoning Creek and West Branch Susquehanna River be included in a single listing for "Tributaries to Susquehanna River". This is a new change following the proposed rulemaking published at 42 Pa.B. 4187 and therefore it appears in the Annex.

#### **Drainage List L**

**98.) Comment:** Currently Noon Branch Wolf Run in its entirety is designated EV, MF. In the proposal it appears that only a portion of Noon Branch is EV, the remainder is designated HQ-CWF. **(22)**

**Response:** The stream segment that flows from the confluence of Noon Branch and Wolf Run downstream to Plunketts Creek is now and was previously designated HQ-CWF, MF. The designated use of this segment is not changing. The proper name of this particular stream segment is Noon Branch according to the NHD Flowline. It was previously recognized by the Department as Wolf Run. A correction is being made to § 93.9l to reflect the change in the official name of this particular stream segment.