Regulatory Analysis Form

(Completed by Promulgating Agency)

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INDEPENDENT REGULATORY REVIEW COMMISSION

IRRC Number: 2954

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(1) Agency:

Department of Environmental Protection

(2) Agency Number:

Identification Number: 7-475

(3) PA Code Cite:

25 Pa Code, Chapter 93

(4) Short Title:

Water Quality Standards – Triennial Review

(5) Agency Contacts (List Telephone Number and Email Address):

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(6) Type of Rulemaking (check applicable box):

- ☐ Proposed Regulation
- X Final Regulation
- ☐ Final Omitted Regulation
- ☐ Emergency Certification Regulation;
  - ☐ Certification by the Governor
  - ☐ Certification by the Attorney General

(7) Briefly explain the regulation in clear and nontechnical language. (100 words or less)

Section 303(c)(1) of The Clean Water Act requires that states periodically, but at least once every 3 years, review and revise as necessary, their water quality standards. This proposed rulemaking constitutes Pennsylvania's current triennial review of its water quality standards. The proposed regulation will update and revise ambient water quality criteria in Section 93.7 Table 3 and Section 93.8c Table 5.

In §§ 93.1, 93.4, 93.7 and 93.8, there are language or typographic corrections proposed to add clarity. In § 93.9a-93.9z, several changes to the drainage lists are proposed to clarify stream names, segment boundaries, and to correct typographical and other errors.

(8) State the statutory authority for the regulation. Include specific statutory citation.

The Pennsylvania Clean Streams Law, Act of June 22, 1937 (P.L. 1987, No. 394) as amended, 35 P.S. § 691.1 et seq.

Section 1920-A of The Administrative Code of 1929, as amended, 71 P.S. § 510-20.

Section 303(c)(1) and (2)(A) of The Federal Clean Water Act, 33 U.S.C.A. §1313(c)(1) and (2)(A).

(9) Is the regulation mandated by any federal or state law or court order, or federal regulation? Are there any relevant state or federal court decisions? If yes, cite the specific law, case or regulation as well as, any deadlines for action.

Section 303(c)(1) of the federal Clean Water Act and 40 CFR 131.20 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 federal 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 for such waters based upon such 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).

The federal regulations describe the states' obligations to develop criteria. 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.

It is the objective of the Clean Water Act to "restore and maintain the chemical, physical and biological integrity of the Nation's waters". A toxic substance discharged into a surface water will, in certain quantities, degrade the chemical and biological integrity of the waters causing disease, death or significantly reducing the reproductive capacity of native flora and fauna. To meet this obligation, and the intent of the law, the Department regulates substances that degrade the integrity of the natural biological community of our waters.

(10) State why the regulation is needed. Explain the compelling public interest that justifies the regulation. Describe who will benefit from the regulation. Quantify the benefits as completely as possible and approximate the number of people who will benefit.

The purpose of developing the water quality standards is to protect 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 regulation is necessary to protect the water resources from the threat of toxic substances. All 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 reduction 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. Health effects from eating contaminated fish may reduce the value of the recreational fishery because the ability to consume fish may be an important attribute of the overall fishing experience. These regulations would reduce bioaccumulative chemicals of concern, such as acrolein, cis-1,2-dichloroethylene and phenols, that currently may affect fish and wildlife 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, streams or lakes. A 2006 study from the Great Lakes region estimated that property values were significantly depressed in 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. "*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 the waters of 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.

(11) If data is the basis for this regulation, please 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 documentation, statistics, reports, studies or research. Please submit data or supporting materials with the regulatory package. If the material exceeds 50 pages, please provide it in a searchable electronic format or provide a list of citations and internet links that, where possible, can be accessed in a searchable format in lieu of the actual material. If other data was considered but not used, please explain why that data was determined not to be acceptable.

Please see the attached rationale documents for specific literature reviews and citations.

Some studies were reviewed, but not used because they were determined to be incomplete for use in calculating the corresponding criteria.

(12) Describe who and how many people will be adversely affected by the regulation. How are they affected?

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.

(13) 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.

See Question #12. Persons with new or existing discharges into surface waters of the Commonwealth must comply with the regulation if the chemical is present in the dischargers effluent at levels that are either toxic to humans or aquatic life. 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.

(14) 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.

In accordance with the federal Clean Water Act, the Department is not to consider achievability or the cost of compliance when developing water quality criteria. (Please see # 9) 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.

There is one area of costs that the Department can provide. The following is a summary of analytical laboratory costs based on the analytical method used. The information was obtained from the National Environmental Methods Index (NEMI) web-site. This web-site can be used to access most EPA approved analytical methods: www.nemi.gov

Analytical Method	Relative Cost	Analytes
EPA 8316	$0 – 50	Acrylamide
EPA 5030C	$51 – 200	Cyclohexylamine 1,4 – Dioxane Acrolein Cis 1,4-dichloroethylene 2-butoxyethanol Benzyl Chloride
EPA 6410B	$201 – 400	Phenol Sulfonic acids
EPA 8015C	$201 – 400	1,4 – Dioxane Acrolein
EPA 8260B	$201 – 400	Trimethylbenzenes Benzyl Chloride
EPA 8270D	$201 – 400	Phenol Resorcinol 2-butoxyethanol
EPA 1624	>$400	1,4 – Dioxane Trimethylbenzenes Cis-1,4 dichloroethylene 2-butoxyethanol
EPA 1625	> $400	Acrolein

(15) 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.

Entities within local governments may be responsible for operating and maintaining publicly owned sewage treatment facilities (i.e., publicly owned treatment works--POTWs). Such facilities require NPDES permits for discharges of effluent to surface waters of the Commonwealth. Such permits require the collection of effluent samples and analyses of pollutant concentrations and often have specific limitations on the concentration or amount (mass) of pollutants that may be discharged to the receiving waters.

The water quality standards established in Chapter 93 are used within DEP modeling applications that use statistics and site-specific information to compute pollutant limitations for permits. Where limitations are not established, DEP may still require monitoring of pollutants in permits if it is believed that the pollutant is "of concern" and should be evaluated at some later time. In both cases (limits and monitoring), a cost is incurred by the NPDES permittee to achieve compliance. DEP's analysis of these regulatory changes to Chapter 93 water quality standards has resulted in a finding that for the majority of the changes, there is no anticipated fiscal impact to local governments, as the pollutants are not typically established as limitations or monitoring requirements in NPDES permits for sewage facilities. To the extent that such pollutants are found in POTW effluent, the industrial sources of the pollutants, which are connected to the POTW, may be subject to pretreatment programs to prevent them from entering the POTW at toxic levels.

(16) Provide a specific estimate of the costs and/or savings to state government associated with the implementation of the regulation, including any legal, accounting, or consulting procedures which may be required. Explain how the dollar estimates were derived.

This regulation is based on and will be implemented through existing Department programs, procedures and policies. There are no additional implementation costs associated with this regulation. The Department does not expect other state agencies to experience any costs associated with any legal, accounting or consulting procedures.

(17) In the table below, provide an estimate of the fiscal savings and costs associated with implementation and compliance for the regulated community, local government, and state government for the current year and five subsequent years.

	Current FY Year	FY +1 Year	FY +2 Year	FY +3 Year	FY +4 Year	FY +5 Year
SAVINGS:	$	$	$	$	$	$
Regulated Community	Not Measurable					
Local Government	"					
State Government	"					
Total Savings	"					
COSTS:						
Regulated Community	Not Measurable					
Local Government	"					
State Government	"					
Total Costs	"					
REVENUE LOSSES:						
Regulated Community	Not Measurable					
Local Government	"					
State Government	"					
Total Revenue Losses	"					

(17a) Provide the past three year expenditure history for programs affected by the regulation.

Program	FY -3 (2009-10)	FY -2 (2010-11)	FY -1 (2011-12)	Current FY (2012-13)
Environmental Protection Operations (160-10381)	84,218,000	78,021,000	77,359,000	74,547,000
Environmental Program Management (161-10382)	31,100,000	28,881,000	27,755,000	24,965,000

(18) Explain how the benefits of the regulation outweigh any cost and adverse effects.

Please see question 10 for a complete description of the benefits of the regulation. Overall, the benefits to the citizens of the Commonwealth will accrue from protecting the surface waters of the Commonwealth for a multitude of water uses. Pennsylvania's surface waters, through the water quality standards program, are protected for a variety of water 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 regulation is necessary to protect the water resources from the threat of toxic substances.

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.

Adverse effects 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.

(19) Describe the communications with and input from the public and any advisory council/group in the development and drafting of the regulation. List the specific persons and/or groups who were involved.

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.

In addition to the above WRAC meetings, an ad hoc committee of WRAC met on August 27 and 29 of 2012 to discuss the science associated with the development of certain proposed water quality standards.

The public was afforded the opportunity to comment on the proposal during a public comment period, which also provided for public hearings.

Following closure of the public comment period for the proposed rulemaking, 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.

The draft final regulation was discussed with WRAC at its November 28, 2012. WRAC approved moving forward with development of final rulemaking for consideration by the Environmental Quality Board.

(20) Include a description of any alternative regulatory provisions which have been considered and rejected and a statement that the least burdensome acceptable alternative has been selected.

There were no non-regulatory alternatives available to consider in this case.

In addition to the flexibility afforded by the regulatory mechanisms in the NPDES permitting program, the water quality regulations include a provision that allows for the development of site-specific water quality criteria, in lieu of the statewide criteria, under certain circumstances. In particular, if site-specific biological or chemical conditions of the receiving waters differ from the conditions upon which the statewide criteria are based, the Department will consider a request for site-specific criteria. A discharger has the opportunity to weigh the costs of developing a site-specific standard against the usage of an existing statewide standard.

(21) 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.

No. The regulations are not more stringent than the companion federal standards allow. Under federal law, 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.

(22) How does this regulation compare with those of other states? How will this affect Pennsylvania's ability to compete with other states?

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 amendments will not put Pennsylvania at a competitive disadvantage to other states.

(23) Will the regulation affect any other regulations of the promulgating agency or other state agencies? If yes, explain and provide specific citations.

No other EQB regulations or state agencies' regulations are affected by this regulation.

(24) Submit a statement of legal, accounting or consulting procedures and additional reporting, recordkeeping or other paperwork, including copies of forms or reports, which will be required for implementation of the regulation and an explanation of measures which have been taken to minimize these requirements.

No additional reporting, record keeping, or other paperwork will be required. No new procedures are being developed with this regulation. New parameters will be added to already-existing Discharge Monitoring Reports.

(25) Please list any special provisions which have been developed to meet the particular needs of affected groups or persons including, but not limited to, minorities, elderly, small businesses, and farmers.

There are no such provisions in this proposed regulation. Similar to the range of costs associated with large businesses, compliance costs for small businesses will vary widely depending on the compliance strategy of the affected entity (e.g., increased treatment, optimization of treatment process, pollutant reduction strategies/best management practices, additional monitoring, and implementation tools).

(26) Include a schedule for review of the regulation including:

A. The date by which the agency must receive public comments: 3rd quarter 2012

B. The date or dates on which public meetings or hearings will be held: during 45-day comment pd

C. The expected date of promulgation of the proposed regulation as a final-form regulation: 2nd quarter 2013

D. The expected effective date of the final-form regulation: 2nd quarter 2013

E. The date by which compliance with the final-form regulation will be required: same

F. The date by which required permits, licenses or other approvals must be obtained: whenever permits/approvals are issued or renewed, after rule is published as final in PaB

(27) Provide the schedule for continual review of the regulation.

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

Also, since there is a federal Clean Water Act requirement to review, and revise as necessary, the Commonwealth's water quality standards at least once every three years, there is inherently a schedule built in for continual review of this regulation.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

RATIONALE FOR THE DEVELOPMENT OF AMBIENT WATER QUALITY CRITERIA FOR

DISSOLVED OXYGEN

PROTECTION OF AQUATIC LIFE USE

Revised 02/01/13

Statement of Issue

Aquatic life in Pennsylvania freshwater waterbodies are currently being protected from adverse impacts associated with low dissolved oxygen by four categories of dissolved oxygen criteria (DO), which is found in PA Code Chapter 93.7 Table 3. Only slight revisions have been made to the numerical component of the dissolved oxygen aquatic life criteria since the Department of Health Sanitary Water Board adopted their Rules and Regulations in 1967. Since then, many new resources of new scientific literature and information have been made available, including EPA's review of literature that resulted in a dissolved oxygen criteria recommendation in the "Quality Criteria for Water 1986" (also known as the "Gold Book"). Based on the availability of updated scientific studies and recent concerns about the appropriateness of the current dissolved criteria, a review of the current information regarding dissolved oxygen requirements of aquatic life was undertaken.

Background

Dissolved oxygen refers to the oxygen gas that is dissolved in the water and made available to aquatic life. Oxygen gets into the water by diffusion from the surrounding air, by aeration from moving water or as a product of photosynthesis. The solubility of oxygen in water is highly dependent on the temperature of the water, but is also affected by atmospheric pressure and salinity. Dissolved oxygen fluctuates diurnally in a freshwater ecosystem due to photosynthesis and respiration. Additionally, DO fluctuates seasonally mostly due to change in water temperatures.

DO requirements for aquatic organisms were highly studied until the 1980's. As such, there are many peer-reviewed studies on the topic. The abundance of literature relating to lethal and sub-lethal effects is helpful to understanding the deleterious effects of low dissolved oxygen concentrations. Many lab experiments studying DO requirements of fish focused on determining minimum DO concentrations necessary to avoid mortality in both adult and larval stages of fishes. Other field and lab studies that examined sub-lethal effects of varying DO conditions have shown stress responses in the form of avoidance, decreased swimming performance, reduction in metabolic rate, reduced growth, and changes in behavior that may increase risk of predation. Additionally, low DO concentrations have been shown to prevent spawning, and

reduce fecundity of female fish in lab experiments. Stress due to low DO has also been shown to increase fish susceptibility to disease and increase the toxicity of certain chemicals and pollutants. The consensus of many DO studies is that early life stages of fish, such as embryonic and larval stages, are generally more sensitive to low DO concentrations than adult life stages. Salmonids generally require higher concentrations of DO than fish that inhabit warmwater ecosystems, however, some warm and cool species of fish such as shad, herring, pike, sculpins and smallmouth bass, are known to be more sensitive than other warm water species.

The determination of appropriate minima, means, frequency and duration for DO criteria is difficult since the lab experiments typically exposed organisms to a constant DO concentration. The DO concentration used in the experiments represents both the minima and the average. EPA states in the 1986 Recommended Criteria document, "biological effects of low dissolved oxygen concentrations depend upon means, minima, the duration and frequency of the minima and the period of averaging." There is a lack of information on the duration and frequency components of DO criteria; therefore most criteria consist of minima and means.

The Department recognizes and respects both the value and the limitations that this data provides. Developing criteria from existing scientific literature is challenging for numerous reasons. The application of study data for criteria development (a controlled environment vs. a multi-variable environment) must be carefully examined. In reality, an inter-relationship exists among parameters within an aquatic ecosystem; a relationship that cannot be adequately captured within the scope of a scientific study. Thus, the application of study data must take into consideration the natural dynamic of the ecosystem to which it is being applied. For example, some of the literature that exists on DO requirements involves studies based on laboratory experiments where the conditions are artificial in several important aspects. With this understanding, the Department has examined the available data and carefully applied it to the selection of the proposed DO criteria.

Pennsylvania Dissolved Oxygen Criteria

Pennsylvania's first dissolved oxygen criteria were found in the Sanitary Water Board Rules and Regulations and were adopted as follows:

b- *Dissolved Oxygen*

b_1 - *Minimum daily average 6.0 mg/l; No value less than 5.0 mg/l*

b_2 - *Minimum daily average 5.0 mg/l; No value less than 4.0 mg/l*

b_3 - *Minimum daily average not less than 5.0 mg/l, except during the period of 4/1 - 6/15 and 9/16 – 12/31, not less than 6.5 mg/l*

b_4 - *Minimum daily average not less than 3.5 mg/l, except during the period of 4/1 - 6/15 and 9/16 – 12/31, not less than 6.5 mg/l*

The following dissolved oxygen criteria were added December 20, 1967:

b_5 – *For the period 3/15 to 6/30 of any year; no value less than 5.0 mg/l. for the remainder of the year,; no value less than 4.0 mg/l*

b_6 – *No value less than 7.0 mg/l*

b_7 – *For lakes, ponds and impoundments only; no value less than 4.0 mg/l in the epilimnion*

b_8 – *For lakes, ponds and impoundments only; no value less than 5.0 mg/l*

Dissolved oxygen criteria b_1 and b_2 corresponded to cold water fishes (CWF) use and warm water (WWF) fishes use, respectively. DRBC dissolved oxygen criteria for the Delaware River and Estuary were incorporated as b_3 and b_4. The b_5 criterion corresponded to the trout stocking use and b_6 corresponded to conservation areas (conservation areas became high quality waters in the 1978-79 rulemakings; both the trout stocking use and conservation area use were added in 1967). The b_7 criterion corresponded to warm water lakes, ponds and impoundments, while the b_8 criterion corresponded to and cold water lakes, ponds and impoundments.

The Sanitary Water Board's dissolved oxygen criteria were similar to, but in some cases, less stringent than, the Federal Water Pollution Control Administration's recommendations in the 1968 "Report of the Committee on Water Quality Criteria" (The "Green Book"). The Green Book recommended that dissolved oxygen criteria in a warm water fishery should be "above 5.0 mg/l assuming normal seasonal and daily variations are above this concentration. Under extreme conditions, however, they may range between 5 and 4 mg/l for short periods during any 24-hour period, provided that the water quality is favorable in all other aspects." For cold water species, the Green book stated that "it is desirable that DO concentrations be at or near saturation. This is especially important in spawning areas where DO levels must not be below 7 mg/l at any time. For good growth and general well being of trout, salmon and their associated biota, DO concentrations should not be below 6 mg/l. Under extreme conditions, they may range between 6 and 5 mg/l provided the water quality is favorable in all other respects and daily and seasonal fluctuations occur."

DER adopted a few changes to the DO criteria in 1973 and 1974. The changes were as follows (underlined):

b_3 - *Minimum daily average not less than 5.0 mg/l, except during the period of 4/1 - 6/15 and 9/16 – 12/31, not less than 6.5 mg/l* <u>as a seasonal average</u>

b_4 - *Minimum daily average not less than 3.5 mg/l, except during the period of 4/1 - 6/15 and 9/16 – 12/31, not less than 6.5 mg/l* <u>as a seasonal average</u>

b_5 – *For the period* <u>2/15 – 7/31</u> *of any year* <u>minimum daily average of 6.0 mg/l.</u>, *no value less than 5.0 mg/l. For the remainder of the year* <u>minimum daily average 5.0 mg/l.</u>, *no value less than 4.0 mg/l.*

*Added:

<u>b_9 - Minimum daily average 7.0 mg/l, No value less than 6.0 mg/l</u>

In the 1976 Quality Criteria for Water, also known as the "Red Book," EPA recommended "a minimum concentration of dissolved oxygen to maintain good fish populations is 5.0 mg/liter. The criterion for Salmonid spawning is a minimum of 5.0 mg/liter in the interstitial water of the gravel." DER Chapter 93 criteria remained as a minimum daily average of 5.0 mg/l and minimum of 4.0 mg/l for warm water fishes, and 6.0 mg/l minimum daily average and 5.0 minimum for cold water fishes.

In 1979 DER adopted additional changes in Table 3; these changes include: the deletions of b_7, b_8 and b_9. Language from the lakes, ponds and impoundment criteria (b_7, b_8) was combined with b_1 and b_2. Additionally, the symbol "b" was replaced with "DO".

In 1986, EPA revised the national water quality criteria recommendations in "Quality for Water 1986," also known as the "Gold Book." EPA reviewed a large body of literature in order to make these recommendations relating to warm water fishes and cold water fishes (including salmonids).

DER made minor reformatting revisions to the DO criteria in Chapter 93.7 Table 3 in 1988, but did not incorporate the 1986 Recommendations for unknown reasons.

DRBC criteria were deleted from Chapter 93.7 Table 3 during the 2000 Triennial Review and referenced in the appropriate segments in 93.9. Consequently, criteria b_3 and b_4 were deleted and the remaining D.O. criteria were renumbered in Table 3.

In 2005, the DO_1 criterion was revised to clarify the criterion that applies to lakes, ponds and impoundments to incorporate reference to the natural stratification that may occur in those waterbodies.

The current dissolved oxygen criteria, as outlined in Chapter 93.7 Table 3 are as follows:

DO_1	For flowing waters, minimum daily average 6.0 mg/l; minimum 5.0 mg/l. For lakes, ponds and impoundments, minimum 5.0 mg/l.	CWF HQ-WWF HQ- TSF
DO_2	Minimum daily average 5.0 mg/l; minimum 4.0 mg/l.	WWF
DO_3	For the period February 15 to July 31 of any year, minimum daily average 6.0 mg/l; minimum 5.0 mg/l. For the remainder of the year, minimum daily average 5.0 mg/l; minimum 4.0 mg/l.	TSF
DO_4	Minimum 7.0 mg/l.	HQ-CWF

Review of "Ambient Water Quality Criteria for Dissolved Oxygen" (1986)

EPA reviewed and considered a large number of studies on dissolved oxygen for the development of the recommended criteria for freshwater aquatic life. Although there are typically two main ways to express a dissolved oxygen criterion: concentration (mg/L) or percent saturation, EPA determined that it is more direct and easier to express the dissolved oxygen criteria as a minimum concentration.

Much of the DO research has focused on acute responses such as mortality or loss of equilibrium. However, there is extreme variability in test conditions even among those studies that focus on a common endpoint (i.e. mortality), such as: constant or declining exposure to low DO conditions, duration of exposure

EPA recommended two separate sets of aquatic life criteria for dissolved oxygen: coldwater criteria for the protection of salmonids and other coldwater species and warmwater criteria for the protection of species indigenous to warm water habitats. The national criteria also differentiate the protection needed for adult fishes and that needed for the early life stages of those same fishes. Early life stages include spawning, incubation of embryos and larvae up to 30 days after hatch.

EPA's rationale for the 1986 criteria included a discussion of the different life stages and thresholds of salmonids and non-salmonids affected by dissolved oxygen, including metabolic and physiological effects, growth, reproduction, behavioral responses, swimming and acute lethal responses. DO requirements for aquatic macroinvertebrates were evaluated as well as other additive responses such as stress from chemicals, temperature and disease.

Salmonids
Of particular interest are the DO concentrations necessary for early life stages of salmonids. Since most species of salmonids have embryonic and larval stages that develop while buried in the gravel of streams or lakes, protection of DO concentrations in the gravel is required. The area where a female salmonid lays her eggs in the gravel is called a "redd." It's complicated to determine what concentration of DO in the surface water in required in order to protect the redds since there are so many variables that affect the DO in the redds. EPA determined that intergravel DO was generally 3 mg/L lower than that of the overlaying surface water by reviewing several studies on DO and redds.

Nonsalmonids (warmwater fish)
The EPA rationale explained that developing criteria for warmwater fish was more difficult than deriving criteria for salmonids because there is less literature available and much more diversity of fishes in a warmwater ecosystem.

Based on literature review, EPA determined that, except for larval stages, non-salmonid species were less sensitive to low dissolved oxygen concentrations than salmonids. However, literature shows that many species of non-salmonids have early life stages that are much more sensitive to low dissolved oxygen concentrations than adult life stages.

The EPA literature review yielded a few generalizations, such as: adults and juveniles of all species studied survive for at least a few hours at DO concentrations as low 3 mg/L, but there is little knowledge about chronic exposure to low DO concentrations. Reduced concentrations of DO also caused reduced growth in studies. For example, Stewart et al. (1967) observed reduced growth in largemouth bass juveniles below 5.8 mg/L.

Macroinvertebrates
EPA stated that there is much less information available on the DO requirements of macroinvertebrates compared to information available on fish. However, even with limited amount of macroinvertebrate studies, EPA stated that the DO requirements for the survival of aquatic macroinvertebrates are "almost certainly greater than those of most fish species." Chronic effects of low DO on macroinvertebrates are not well known, but EPA suggested that "concentrations adequate to avoid impairment of fish production probably will provide reasonable protection for invertebrates as long as lethal concentrations are avoided."

Temperature Stress
EPA examined studies to evaluate the synergistic effect of temperature and DO on fishes. EPA concluded that "high temperatures almost certainly increase the adverse effects of low dissolved oxygen concentrations." Since most of the laboratory experiments on fish DO requirements are performed using temperatures near the mid-range of the fishes' temperature tolerances, criteria based on these lab studies alone may be under protective at high temperatures that are stressful to fish.

Chemical Stress
EPA discussed several laboratory studies that evaluated the effect of low DO concentrations on the toxicity of various chemicals, such as lead, zinc, copper, monohydric phenols, ammonia, hydrogen sulfide, napthenic acid and potassium cyanide. Some of these chemicals are commonly found in oxygen-demanding wastes. Overall, the studies showed that low DO concentrations increased the toxicity of these chemicals in the fish species studies.

Disease Stress
EPA reviewed the results of several studies that suggest that fish become more susceptible to disease when stressed by low DO concentrations. These studies suggest that many fish pathogens are continuously present in many waterbodies, but fish are only susceptible to infection when their defenses are compromised by stress.

Discussion of DO Literature
EPA summarized a large body of literature in its revisions of recommended DO criteria. This review resulted in a risk level assessment to protect aquatic life from impacts due to low DO concentrations. The qualitative levels of risk include: no production impairment, slight production impairment, moderate production impairment, severe production impairment and limit to avoid acute mortality. Production impairment refers to production impairments in a fishery. EPA summarized the DO concentrations judged to achieve protection at the qualitative levels of risk in a table in the recommended criteria. The recommended criteria were then derived from the DO concentrations in this table.

The DO concentrations that correspond to each risk level were derived from growth data for "other life stages" and are approximately equivalent to 10%, 20% and 40% growth impairment for slight production impairment, moderate production impairment and severe production impairment, respectively. EPA states that, "growth impairment of 50% or greater is often

accompanied by mortality, and conditions allowing a combination of severe growth impairment and mortality are considered as no protection."

DO concentrations corresponding to risk levels for early life stages are based on subjective judgments and generalizations of the response curve shape between what would result in no production and impairment and the acute mortality limit. EPA's recommended criteria is based on the DO concentrations judged to be equivalent to the level of risk that was determined to be appropriate for a national criterion.

Proposed Dissolved Oxygen Criteria

The Department proposes to incorporate the DO concentrations from EPA's risk level assessment in its DO criteria. Instead of incorporating values associated with severe production impairment and protection of only acute mortality, the Department proposes to incorporate the slight production impairment as 7-day averages and the moderate production values as minima for early life stages and other life stages to protect aquatic life. It is important to note that the proposed criteria apply to flowing freshwater streams, the epilimnion of a naturally stratified lake and throughout the waterbody of non-stratified lakes. These criteria apply to tidal portions of the Delaware River and its tributaries since the tidal portions within Pennsylvania contain predominantly freshwater biological communities.

CWF Criteria

In Pennsylvania, three species of salmonids are commonly found, due to natural reproduction or stocking: brook trout, brown trout and rainbow trout. Steelhead trout are found in the tributaries of Lake Erie and in Lake Erie; Steelhead are a subspecies of rainbow trout.

The Department proposes adopting criteria for coldwater embryonic and larval stages for the appropriate season, depending on whether the species historically spawns in the fall or in the spring. These time periods are based on discussions with Pennsylvania Fish and Boat Commission and can be found in §93.7 (b). The criteria will apply to water column concentrations and therefore will need to achieve intergravel concentrations that will be protective of embryonic and larval stages up to 30 days after hatch. The Department proposes 9.0 mg/l on a 7-day average and 8.0 mg/l as a minimum as the criteria protective of early life stages developing in redds. For the remainder of the year, or year-round in surface waters where natural Salmonid reproduction does not occur: a 7-day average of 6.0 mg/l and minimum of 5.0 mg/l were calculated from the slight production impairment and the moderate impairment value, respectively.

§93.7(b) is added to describe the times of the year the criteria for early life stages apply. Protected early life stages include those embryonic and larval life stages resulting from natural reproduction and is not intended to protect stocked trout fingerlings. The spring spawning Salmonids include Steelhead trout in the Lake Erie basin and the few populations of naturally reproducing rainbow trout [other than Steelhead] around the state. The fall spawning salmonids include brown trout and brook trout.

§93.7(b) also includes language that allows discretion to be applied where it can be demonstrated that natural reproduction of salmonids does not occur and is documented that reproduction has not occurred historically. The criteria for determining whether or not natural salmonid reproduction occurs are based on criteria used by Pennsylvania Fish and Boat Commission to document trout reproduction.

WWF Criteria

The Department proposes to adopt the criteria for warmwater early life stages as the criteria for warm water fishes (WWF). Proposed criteria for WWF are 5.5 mg/l as a 7-day average and 5.0 mg/l as a minimum. Based on discussions with Pennsylvania Fish and Boat Commission, these values are appropriate since PA warm water fisheries are so diverse and include fish species that spawn from early spring to late summer. For example, smallmouth bass typically spawn in the months of May and June in Pennsylvania and therefore early life stages are present during the summer. Late summer spawners (ex: green sunfish and bluegill) lead to the presence of early life stages during the fall and winter. Furthermore, the seasonal change in water temperature is what prompts many warm water species to spawn, and the exact calendar date which these water temperature changes will occur cannot be predicted from year to year. As a result of such variation, it is difficult to discern the specific times of year that require protection of early life stages; therefore, it is appropriate to offer protection of early life stages year-round. An extensive literature search also indicates that the proposed criteria are protective for growth of warm water species in the warm summer months, migration of diadromous fish species and survival of macroinvertebrates.

Laboratory studies on early life stages of warm water fishes show that larval life stages are more sensitive to DO than are embryonic and adult life stages. Many studies show that Centrarchid (bass family) juveniles may be the most sensitive of all warm water fishes to low DO concentrations. In Whitmore's (1960) laboratory experiment, largemouth bass juveniles avoided DO levels equal to or less than 4.5mg/L, and no avoidance occurred at 6 mg/L DO. In experiments by Spoor, larval smallmouth bass were shown to be highly sensitive to low DO from day two through day ten after hatching and hatched at a larger size, but grew slower than largemouth bass (Spoor 1977;1984). At or below dissolved oxygen concentrations of 4.5 mg/L, smallmouth bass hatching and larvae survival was observed to be significantly reduced (Siefert et al., 1974; Spoor, 1984). Lethal and sublethal effects of reduced D.O. (less than 5 mg/L) witnessed in laboratory experiments were, in general, directly related to exposure times which ranged from hours to days (Mount, 1964; Doudoroff & Shumway, 1970; Siefert et al., 1974; Spoor, 1984).

In addition, Spoor (1984) notes that that raising the temperature from 20°C (68°F) to 25°C (77°F) increased the smallmouth bass larvae's sensitivity to oxygen deficiency. It is also important to note that smallmouth bass typically spawn in May and June in Pennsylvania and therefore early life stages are present in the summer. Ambient stream temperatures may reach in excess of 30°C (86°F) in the summer. Chapter 93 Temperature Criteria for June is 84°F and 87°F in July and August.

"Doudoroff and Shumway (1970) were tasked with developing recommendations for DO criteria for freshwater fishes and suggested using various curves to calculate seasonal DO criteria

corresponding to the natural DO of a water body and various protection levels. Other indices have been developed that relate fishery performance/suitability to DO concentrations given a particular species. The Habitat Suitability index developed by the USFWS for Smallmouth bass provides a wealth of species information including a model for DO (Edwards et al., 1983). In this model, 5 mg/L DO is associated with a Suitability Index value of approximately 70%. Similarly in Doudoroff and Shumway (1970), the multi-species, multi-life stage averaged trend line in Figure 2 (Relative Performance Index vs. DO, p. 270) generally agrees with Edwards et al. (1983), scoring slightly higher at approximately 83% Relative Performance Index (at 5 mg/L DO). At 5 mg/L, both indices indicate a reduction in environmental conditions potentially resulting in suboptimal population condition (growth rates, swimming speeds, weight at hatching, survival, etc.)" (Fischer 2009).

Several field studies concerning dissolved oxygen have been conducted; these studies support a minimum of 5 mg/l for protection of warm water fish species. After performing an extensive field study of dissolved oxygen conditions, Ellis (1937) stated that 5 mg/l dissolved oxygen is the "lowest value which may be reasonably be expected to maintain in good condition varied fish faunae of warm-water fishes" when the temperature is above 20°C (68°F) and that 5 mg/l is "approximately the lower limit of favorable conditions". Coble (1982) related fish populations from the Wisconsin River to dissolved oxygen concentration and concluded that percent sport fish, percent walleyes and yellow perch, percent Centrarchidae (bass family), number of fish species, and number of species of sport fish were all greater at sites where the average summer DO concentration exceeded 5 mg/L. Coble (1982) stated that the level of 5 mg/L could be identified as a threshold from poor to good fish populations and strongly supported a DO criterion of no less than 5 mg/L.

Since the anadromous American shad use the Susquehanna and Delaware River basins to complete their life stages, and blueback herring and alewife (collectively river herring) utilize the Delaware River basin, criteria in these WWF river basins must also protect for these migratory Clupeid species. Stier and Crance (1985) determined that dissolved oxygen concentrations less than 5 mg/l would create a migratory block for American shad adults and juveniles. DO concentrations of 5 mg/l are required throughout the American Shad's spawning area. A study referenced by Stier and Crance found no shad eggs in water where DO concentrations were less than 5 mg/l. Maes et al (2007) modeled migration of migratory fish species in Europe (including a species of shad) and concluded that a "baseline concentration of 5 mg/l considerably increases the opportunity for diadromous fish species to pass."

Pennsylvania Fish and Boat Commission summarized that "Given the data and observations in the available literature, largemouth and smallmouth bass are sensitive enough to depressed D.O. concentrations that avoidance may initiate at 4.5 mg/L. Sublethal and lethal effects, in general, are inversely correlated with D.O. concentration. Environmental degradation may significantly complicate threshold values of D.O. for fishes. "Activity and the presence of toxic materials probably would raise the critical concentration substantially." (Mount, 1964). Data presented by researchers and conclusions published by literature reviewers all bottle neck toward a common threshold value of approximately 5 mg/L for freshwater fishes. A prudent and responsible approach to choosing a criterion would not be to accept the highest D.O. concentration where harmful effects are witnessed, but to choose a criterion that prevents D.O. levels from reaching

those harmful effects (Fischer 2009)." "Additional stressors such as various pollutions and increased water temperatures during low flow periods would increase this D.O. threshold; therefore, 5 mg/L should be viewed as a value providing a minimal margin of protection to a multi-species warm water fishery throughout all life stages. Such an assertion is supported by the relation of a single criterion of 5 mg/L to the models provided by Doudoroff and Shumway (1970) [and Edwards et al. (1983) specifically for Smallmouth bass] and the conclusions drawn by Coble (1982)". (Fischer 2009).

TSF Criteria

The Department proposes to adopt the Salmonid other life stages slight production impairment value (6.0 mg/l) as a 7-day average and the Salmonid other life stages moderate production impairment value (5.0 mg/l) as a minimum for during the period of February 15 through July 31 to protect for stocked trout; and nonsalmonid early life stages slight production impairment value (5.5 mg/l) as a 7-day average and the nonsalmonid early life stages moderate production impairment value (5.0 mg/l) as a minimum as the criteria for the remainder of the year for Trout Stocking use (TSF). Proposed criteria for TSF are "For the period February 15 to July 31 of any year, 7-day average 6.0 mg/l; minimum 5.0 mg/l. For the remainder of the year, 7-day average 5.5 mg/l; minimum 5.0 mg/l."

HQ designated streams

Revisions to D.O. criteria do not include specific minima for high quality streams. As stated in chapter 93, "the water quality of High Quality Waters shall be maintained and protected, except as provided in §93.4c.(b)(1)(iii)." Since existing quality must be maintained, a D.O. criterion for these streams is unnecessary.

Use of averages and minima

The Department is proposing to adopt all averages as 7-day averages and instantaneous minima to simplify the criteria. EPA's national criteria include 30-day averages and 7-day mean minima. EPA stated that the averaging period for criteria for protection of early life stages should not exceed 7 days to ensure it is adequately protective.

Although it would be ideal to have minima, means, duration and frequency components in the proposed DO criteria, the information is not available to determine the protective duration and frequency. Also, it cannot be assumed a minimum criterion will only occur occasionally and for short periods of time just because it is paired with a protective mean value criterion. Since DO conditions may fluctuate widely diurnally, especially when there is a large amount of algal activity, a mean value could be misleadingly high and obtained even when a minimum is reached every day/night for many hours and oxygen is supersaturated during the other part of the day. Therefore, it is important to have both average and minimum but it is necessary for the minimum to be protective even if it occurs every day, and not use an extreme low value that only protects for acute survival.

Proposed Dissolved Oxygen Criteria

Dissolved Oxygen

The following specific dissolved oxygen criteria recognize the natural process of stratification in lakes, ponds and impoundments. These criteria apply to flowing freshwater and to the epilimnion of a naturally stratified lake, pond or impoundment. The hypolimnion in a naturally stratified lake, pond or impoundment is protected by the narrative water quality criteria in § 93.6 (relating to general water quality criteria). For nonstratified lakes, ponds or impoundments, the dissolved oxygen criteria apply throughout the lake, pond or impoundment to protect the critical uses.

Symbol	*Criteria*	*Critical Use**
DO_1	For flowing waters, 7-day average 6.0 mg/l; mg/l; minimum 5.0 mg/l. For salmonid early life stages, applied in accordance with (b), 7-day average 9.0 mg/l; minimum 8.0 mg/l. For lakes, ponds and impoundments, minimum 5.0 mg/l.	CWF
DO_2	7-day average 5.5 mg/l; minimum 5.0 mg/l.	WWF
DO_3	For the period February 15 to July 31 of any year, 7-day average 6.0 mg/l; minimum 5.0 mg/l. For the remainder of the year, 7-day average 5.5 mg/l; minimum 5.0 mg/l.	TSF

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(b) For naturally reproducing salmonids, protected early life stages include: all embryonic and larval stages and all juvenile forms to 30 days after hatching. The DO_1 standard for naturally reproducing Salmonid early life stages shall apply during October 1 through May 31.

The DO_1 standard for naturally reproducing Salmonid early life stages applies unless it can be demonstrated to the Department's satisfaction, that the following conditions are documented: 1) the absence of young of the year salmonids measuring less than 150 mm in the surface water; and 2) the absence of multiple age classes of salmonids in the surface water. These conditions shall only apply to salmonids resulting from natural reproduction occurring in the surface waters. Additional biological information may be considered by the Department which evaluates the presence or absence of early life stages.

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

RATIONALE FOR THE DEVELOPMENT OF AMBIENT WATER QUALITY CRITERIA FOR THE PROTECTION OF AQUATIC LIFE USE

(Revised February 2013)

Ambient water quality criteria are numeric values limiting the amount of chemicals present in our nation's waters. A water quality criterion is the highest concentration of a pollutant in water that is not expected to pose a significant risk to, or adversely impact, in this case, aquatic life. Water quality criteria are based solely on the best available scientific data and scientific judgments on pollutant concentrations and environmental or human health effects.

The following water quality criteria for aquatic life are being evaluated as part of this triennial review of water quality standards. They have been either recommended by EPA, or have been developed by the Department since the previous triennial review was finalized in April, 2010:

- Acrolein
- Nonylphenol
- Sulfonic Acid compounds and Resorcinol

ACROLEIN

The Department is proposing that the PA Environmental Quality Board (EQB) adopt the EPA recommended freshwater aquatic life criteria for acrolein. (August 2009; EPA-822-F-09-004)

Acrolein is a priority pollutant and is currently listed in 25 PA Code, Chapter 93 Table 5. It is a widely used product and is used in the preparation of polyester resin, polyurethane, propylene glycol, and acrylic acid. It is also used as an herbicide to control submersed and floating weeds and algae in irrigation canals. In July, 2009 EPA published final aquatic life criteria for acrolein based on a 2007 data search that revealed new acute and chronic toxicological data. The updated aquatic life criteria were calculated using "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and their Uses" (Stephan et al. 1985).

In order to be consistent with the Federal recommendations, the Department is proposing to adopt the aquatic life criteria as stated in the EPA aquatic life document for Acrolein, August 2009, "Freshwater aquatic life and their uses should not be affected if the one-hour average

concentration of acrolein does not exceed 3 ug/L more than once every three years on the average (acute criterion) and if the four-day average concentration of acrolein does not exceed 3 ug/l more than once every three years on the average (chronic criterion)." Upon adoption, the criteria will be placed in Chapter 93, Table 5 (relating to water quality standards for toxic substances).

NONYLPHENOL

The Department is proposing that the EQB adopt the EPA recommended freshwater aquatic life criteria for nonylphenol (EPA-822-F-05-003, Feb. 2006).

Nonylphenol is an organic chemical produced in large quantities in the United States, and is expected to be present in Pennsylvania surface waters. It is toxic to aquatic life, causing reproductive effects in aquatic organisms. Nonylphenol is moderately soluble and resistant to natural degradation in water.

Nonylphenol is one of the substances on Pennsylvania's list of emerging contaminates and is also on the National priority list of contaminates. Preliminary monitoring performed by USGS (2009) has detected nonylphenol in PA waters. It is used as a chemical intermediate in the processing of other chemicals and is often found in wastewater treatment plant effluent as a breakdown product from surfactants and detergents.

The chronic toxicity studies used by EPA to derive criteria for nonylphenol include assessments on growth and reproduction, including the estrogenic effects which have been shown to cause deformities in aquatic organisms. *Aquatic Life Ambient Water Quality Criteria – Nonylphenol,* (December 2005) "Freshwater aquatic life and their uses should not be affected if the one-hour average concentration of nonylphenol does not exceed 28 ug/L more than once every three years on the average (acute criterion) and if the four-day average concentration of nonylphenol does not exceed 6.6 ug/l more than once every three years on the average (chronic criterion)." Upon adoption, the criteria will be placed in Chapter 93, Table 5 (relating to water quality standards for toxic substances).

CRITERIA DEVELOPED BY THE DEPARTMENT

Other aquatic life use criteria for toxic substances to be included in this rational are for criteria that were developed by the Department. The calculated criteria were developed using the current best available toxicity data, scientific information, and methods described in "Guidelines for Deriving Numerical Water Quality Criteria for the Protection of Aquatic Life and Their Uses" (Stephan et al. 1985) (1985 Aquatic Life Criteria Guidelines). The compounds and the toxicity data used in the criteria derivation are as stated below:

SULFONIC ACID COMPOUNDS AND RESORCINOL

The Department is proposing aquatic life criteria for the sulfonic acid compounds and resorcinol:

- meta-benzene disulfonic acid (m-BDSA)

- benzene monosulfonic acid (BSA)
- p-phenol sulfonic acid (p-PSA)
- resorcinol

Sulfonic acids are present in the environment as a result of the widespread use of detergents in industry, agriculture, coal mining drilling fluid additives and formulations for oil recovery operations. Because water quality criteria had not been developed for the sulfonic acids or resorcinol by either the Department or the U.S. EPA, AMEC Earth & Environmental (AMEC), a consulting company, used the U.S. EPA's national guidelines to develop aquatic life water quality criteria (Stephan, et al., 1985) in accordance with 25 Pa. Code § 16.22. (AMEC. April 2008).

The AMEC studies included a comprehensive review of relevant literature and existing toxicity data. These studies also required that a series of acute and chronic toxicity tests be conducted since there was insufficient existing toxicity data available to meet U.S. EPA's established minimum data requirements for aquatic life criteria development. AMEC used a variety of U.S. EPA and/or ASTM approved methods and protocols for conducting the different series of biotoxicity tests, depending on what was determined to be appropriate for the particular species being tested.

The Department reviewed AMEC's documentation. U.S. EPA performed an informal review of this documentation, and the process used by AMEC. Based on comments forwarded to the Department from the U.S. EPA's Health and Ecological Criteria Division in the EPA Office of Science and Technology, it was determined that AMEC followed the U.S. EPA National Guidelines on toxicity testing and criteria development. However, based on a more thorough review of the calculations and data tables, U.S. EPA provided additional recommendations to correct errors found in some reported values. AMEC revised its ambient water quality report and updated the report titled "Development of Ambient Water Quality Criteria for Benzene Metadisulfonic Acid, Benzene Monosulfonic Acid, p-Phenol Sulfonic Acid and Resorcinol" (AMEC. 2008). This updated report, dated April 3, 2008, incorporates revisions based on recommendations provided by the U.S. EPA and the Department.

Summary of Criteria Development

Based on the results of the studies presented by AMEC, the Department is proposing that the EQB adopt the following ambient water quality criteria for the sulfonic acids and resorcinol.

Compound	CAS Number	Acute AWQC Criterion Maximum Concentration (ug/l)	Chronic AWQC Criterion Continuous Concentration (ug/l)	Health Effect
Benzene Metadisulfonic Acid	00098486	2600000	1600000	

Benzene Monosulfonic Acid	00098113	2000000	1200000	
p-Phenol Sulfonic Acid	00098679	3500000	1400000	
Resorcinol	01084603	28000	7200	

Upon approval these criteria will be placed in 25 Pa. Code Chapter 93, Table 5 (relating to water quality criteria for toxic substances).

REFERENCES USES IN THIS EVALUATION:

1. **Stephen, Charles, et al. (1985).** ***Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses.***

2. **Nonylphenol, Dec. 2005, Aquatic Life Ambient Water Quality Criteria –US EPA (EPA-822-F-05-005).**

3. **AMEC Earth & Environmental 2008. Development of Ambient Water Quality Criteria for Benzene Metadisulfonic Acid, Benzene Monosulfonic Acid, p-Phenol Sulfonic Acid and Resorcinol (AMEC April 3, 2008).**

4. **INDSPEC Chemical Corporation (May 2004).** ***Data Analysis and Test Plan for Resorcinol.***

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

RATIONALE FOR THE DEVELOPMENT OF AMBIENT WATER QUALITY CRITERIA FOR THE PROTECTION OF

HUMAN HEALTH USE

(Revised February 2013)

Ambient water quality criteria are numeric values limiting the amount of chemicals present in our nation's waters. A water quality criterion is the minimum or maximum concentration of a pollutant in water that is not expected to pose a significant risk to, or adversely impact, in this case, human health protection. These water quality criteria are based solely on the best available scientific data and scientific judgments on pollutant concentrations and environmental or human health effects.

The Department uses the provisions stated in PA Code, Chapter 16 (relating to the statement of policy), Sections 16.32 and 16.33 to develop human health criteria. The primary source used to obtain relevant risk assessment values is the Environmental Protection Agency's, (EPA's) Integrated Risk Information System (IRIS). IRIS is an electronic data base maintained by the EPA's National Center for Environmental Assessment (NCEA) that contains summaries of adverse health effects that result from lifetime (chronic) exposure to chemical substances. The summaries in IRIS contain health effects information, including reference doses (RfD's) for non-cancer effects resulting from oral exposures, cancer weight of evidence designations and cancer slope factors. EPA uses an ongoing screening-level review of scientific literature for chemicals in IRIS. (EPA, *Screening-Level Review of the Recent Health Effects for IRIS Chemicals*) Risk assessment information contained in IRIS, except as specifically noted, has been reviewed and agreed upon by an interdisciplinary group of scientists representing various program offices within the Agency and represents Agency-wide consensus. Therefore, these updated values reflect the most current science. The screening-level review, consists of:

- Identifying recent toxicological secondary source documents prepared by EPA and other authoritative scientific organizations
- Conducting literature searches to identify relevant health effects literature published since the IRIS assessment for a given chemical was completed and posted on IRIS
- Sorting literature and evaluating the new health effects information and determining if this information could potentially produce a significant change in IRIS toxicity values.

(EPA, *Screening-Level Review of the Recent Health Effects for IRIS Chemicals*)

Authoritative Secondary Sources Considered for Screening Level Review:

- Agency for Toxics Substances and Disease Registry (ATSDR) Toxicological Profiles
- Health Canada assessments
- International Agency for Research on Cancer (IARC) Monographs
- World Health Organization/International Programme on Chemical Safety (WHO/IPCS) - Environmental Health Criteria
- National Toxicology Program (NTP) Cancer Bioassay
- NTP report on Carcinogens
- Office of Pesticide Programs (OPP) Reregistration Eligibility (RED) documents
- NCEA Provisional Peer-reviewed Toxicology Values
- Documents submitted to IRIS Submission Desk
- World Health Organization/International Programme on Chemical Safety (WHO/IPCS) – Concise International Chemical Assessment Document (CICADS) (EPA, *Screening-Level Review of the Recent Health Effects for IRIS Chemicals*)

The Department is proposing criteria, that will protect human health uses, for the following toxic substances. This list also contains toxic substances that have been recommended by EPA since the completion of Pennsylvania's previous triennial review, which was finalized in April, 2010:

- acrolein and phenol
- acrylamide
- benzyl chloride
- 2-butoxyethanol
- cis-1,2-dichloroethylene
- cyclohexylamine
- resorcinol
- strontium
- 1,2,4 and 1,3,5 trimethylbenzene

CRITERIA DEVELOPED BY EPA

Acrolein and Phenol

Acrolein and phenol are priority pollutants and are currently listed on the federal 304(a) list of the National Recommended Water Quality Criteria. The criteria for phenol and acrolein are being updated because of more recent reference dose's (RfD) available from the EPA, IRIS database.

Because recalculation of these two criteria resulted in significant changes, EPA published notice in the Federal Register on September 15, 2008 (73 FR 53246) in order to solicit scientific views. EPA indicated, however, in that Federal Register notice that they did not intend to subject this recalculation to additional peer review concerning the RfD because the IRIS RfD's being updated in the subject draft partial criteria update had been previously peer reviewed. EPA published notice of final criteria for acrolein and phenol in the Federal Register on June 10, 2009 (74 FR 27535), which supersedes earlier criteria published by EPA. Human health criteria - acrolein and phenol, May, 2009 (EPA-822-F-009-001).

Acrolein is a widely used product. It is used in the preparation of polyester resin, polyurethane, propylene glycol, and acrylic acid. It is also used as an herbicide to control submersed and floating weeds and algae in irrigation canals. Phenol was first extracted from coal tar, and its major uses involve its conversion to plastics or related materials. Phenols are used in creating polycarbonates, epoxies, nylon, detergents, herbicides and pharmaceuticals.

In order to be consistent with the national criteria recommendations, based on this latest scientific information on reference doses, the Department recommends that the Environmental Quality Board (EQB) proposes to incorporate the updated, recalculated human health criteria for phenol to 10400 ug/L, and for acrolein to 6.0 ug/L.

CRITERIA WITH CANCER RISK LEVELS (CRL) LISTED IN IRIS

Benzyl Chloride

Benzyl chloride is used as an intermediate in the processing of dyes, pharmaceuticals and perfumes. It can also be used in the production of synthetic tannins and as a gum inhibitor in gasoline. (National Library of Medicine HSDB Database) EPA has labeled benzyl chloride as a probable human carcinogen. Toxicity data in IRIS reveals that benzyl chloride affects the thyroid causing cancerous cells to develop.

Based on the most current data available in IRIS and the exposure assumptions in the Department's statement of policy, the calculated cancer risk level is 0.2 ug/L. The Department is therefore recommending that the EQB propose to adopt the IRIS calculated CRL for benzyl chloride. (0.2 ug/L)

CRITERIA DEVELOPED BY THE DEPARTMENT

These proposed criteria were developed using the current best available toxicity data. The sources the Department uses to obtain relevant risk assessment values to calculate criteria to protect human health are found in Chapter 16 (relating to guidelines for development of human health-based criteria). The main sources are:

The EPA agency-wide supported data system known as IRIS.
Maximum contamination level goals (MCLG),
The EPA CWA § 304(a) health criteria listed under the National Toxics Rule in 40 CFR 131.35 and other final criteria published by the EPA and the Great Lakes Initiative Clearinghouse.
Teratology and other data that have been peer-reviewed.

Depending on the toxicity data available the criteria are developed either as threshold toxics or non-threshold (cancerous) toxics. Both the threshold human health (THH) and non-threshold cancer risk level – (CRL) criteria are calculated using the EPA Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health – 2000. The substances and the toxicity data used to calculate the criteria for each substance are as stated below:

Acrylamide

Acrylamide is an industrial chemical used mainly in the production of polyacrylamides, which are used as flocculants for clarifying drinking water and treating municipal and industrial effluents. It is also used 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. (ATSDR Toxicological profile for acrylamide)

On March 22, 2010, EPA provided new toxicity data for acrylamide in the IRIS database. The carcinogenicity assessment in IRIS has acrylamide labeled as, "likely to be carcinogenic to humans". An oral slope factor of 0.5 mg/kg-day has been established to determine a cancer risk. In addition to the exposure assumptions found in Chapter 16, the toxicity data was used to calculate the criterion.

Based on the most current toxicity data in IRIS the Department is recommending that the EQB propose an acrylamide human health CRL of .07 ug/L.

2-Butoxyethanol

2-butoxyethanol is used as a solvent in spray lacquers, enamels, varnishes, and latex paints and as an ingredient in paint thinners and strippers, varnish removers, and herbicides. (Agency for Toxic Substances and Disease Registry – ATSDR, Toxicity Profiles). It is also used as a bulk additive in the hydro-fracking process. Based on studies recorded in the IRIS data base 2-butoxyethanol has been shown to cause damage to the liver.

The Department used toxicity data obtained from IRIS, to calculate a human health criterion for 2-butoxyethanol.

In addition to using the exposure assumptions found in Chapter 16, the THH criteria for 2-butoxyethanol was calculated using the following toxicity data:

.1 mg/kg-day - RfD – IRIS
2 L/kg - Bioconcentration factor (BCF), Agency for Toxic Substances and Disease Registry – ATSDR, Toxicity Profiles
0.2 - relative source contribution (RSC)

Based on the most current toxicity data in IRIS, the Department is recommending that the EQB propose a THH criterion for 2-butoxyethanol of 700 ug/L.

cis-1,2-dichloroethylene (DCE)

Dichloroethylene occurs in two forms, cis-1,2-DCE and trans-1,2-DCE. 1,2-DCE is used as a solvent for waxes, resins, polymers, fats, and lacquers. It is also used as an intermediate in the preparation of other chlorinated solvents. Trans-1,2-DCE is on EPA's list of priority pollutants and is currently listed in Chapter 93 (relating to water quality standards), Table 5. Because cis-

1,2-DCE is an isotope of DCE, and there is newly developed toxicity data available in IRIS, the Department is proposing to incorporate the human health criterion for cis-1,2-DCE into Chapter 93, Table 5. Cis-DCE is used as a solvent in waxes, resins, in the extraction of rubber, as a refrigerant and the manufacture of pharmaceuticals. (US EPA, Basic Information about cis-1,2-DCE) The criterion for trans-1,2-DCE was also reviewed but there was no update to the national recommendation.

On September 30, 2010, US EPA posted toxicity data in IRIS for developing human health criteria for cis-1,2-DCE. The THH criterion for cis-1,2 –DCE was calculated using the following toxicity data in addition to the exposure assumptions found in Chapter 16:

.002 mg/kg-day - Oral Chronic RfD for cis-1,2-DCE – IRIS
23 L/kg - Bioconcentration factor (BCF), (US EPA, National Primary Drinking Water Regulations Technical Factsheet on cis-1,2-DCE)
0.2 - default relative source contribution (RSC)

The proposed calculated cis-DCE criterion is more stringent than the trans-DCE isotope that is currently listed as a priority pollutant. Therefore, the Department is recommending that the EQB propose the cis-DCE criterion and place it in Table 5 with its isotope, trans-DCE. The calculated human health criterion for cis-1,2- DCE is 12 ug/L.

Cyclohexylamine

Cyclohexylamine is listed as an extremely hazardous substance according to Section 302 of the US Emergency Planning and Community Right- to -Know Act. It is used in boiler water treatment as a corrosion inhibitor, in rubber and plastic synthesis, agricultural chemicals and as an emulsifying agent. (Hazardous Substance Data Bank -HSDB, 2002) Based on toxicity studies in IRIS, cyclohexylamine has been shown to cause reproductive damage. Cyclohexylamine is very toxic by ingestion and is readily absorbed through the skin.

The THH criterion for cyclohexylamine was calculated using the following toxicity data in addition to the exposure assumptions found in Chapter 16:

.2 mg/kg-day - RfD – IRIS
3 L/kg - Bioconcentration factor (BCF), National Library of Medicine, Hazardous Substance Databank. US EPA, Health and Environmental Effects Document for cyclohexylamine, Office of Health and Environmental Assessment, 500ECAOCING017
0.2 - relative source contribution (RSC)

The Department is recommending that the EQB propose to incorporate a human health criterion for cyclohexylamine. Toxicity data obtained from IRIS was used to calculate a human health criterion of 1000 ug/L.

Resorcinol

Beazer East, Inc. (Beazer) implemented environmental investigations and remediation at sites in Butler and Armstrong Counties, Pennsylvania in cooperation with the Department of Environmental Protection (Department) and United States Environmental Protection Agency (U.S. EPA). Currently, with respect to surface water, there is no ambient water human health criteria for resorcinol.

The Beazer sites are located within an area approximately 60 square miles in size that has been designated by the Department under the Hazardous Sites Cleanup Act (HSCA) as the "Bear Creek Area Chemical Site" (BCACS). The Department has determined that environmental media (i.e. soil and groundwater) within the BCACS have been impacted by sulfonate compounds (the sulfonate compounds include meta-benzene disulfonic acid (m-BDSA), benzene monosulfonic acid (BSA), p-phenol sulfonic acid (p-PSA)), resorcinol and other hazardous substances. Resorcinol is used as a chemical intermediate for the synthesis of pharmaceuticals and other organic compounds. It is used in the production of dyes and plasticizers and as a UV absorber in resins. The Department developed a resorcinol ambient water quality criterion for the protection of human health since it was discovered during this evaluation of water quality criteria that human health is the most sensitive use to be protected.

The Department, calculated a threshold human health criterion using EPA's approved methodology, 2000 and toxicity data from Resorcinol – Concise International Chemical Assessment Document 71, which was published in 2006 under the United Nations Environment Programme, the International Labour Organization, and the World Health Organization. The Department also used information from the Data Analysis and Test Plan for Resorcinol, INDSPEC Chemical Corporation, May 2004. The Department is recommending that the EQB propose a human health criterion for resorcinol (2700 ug/L) which was developed using the exposure assumptions found in Chapter 16 and following equation, variables, and sources of data:

AWQC (ug/L) = NOAEL/ UF x RSC x (BW/DI + (FI x BCF)) x 1000, where:

- **RfD Equivalent** for resorcinol – **NOAEL/UF** (0.4mg/kg-day)
  - **NOAEL** – No Observed Adverse Effect Level (50 mg/kg-day) (*Concise International Chemical Assessment Document 71,* 2006)
  - **UF** – Uncertainty factor (100, 10 –intra species, 10 – inter species variations) (*Concise International Chemical Assessment Document 71,* 2006)
- **RSC** – Relative Source Contribution - .20 (Accounts for the non-water sources of exposure.) (EPA, 2000)
- **BCF** – Bioconcentration Factor – 3.162.0 L/kg (INDSPEC Chemical Corporation)

Strontium

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. 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). It is also a component of the effluent from natural gas production. The absorption of strontium in the body is similar to that of calcium. Strontium will migrate to the bones. Excess strontium causes problems with growing bone. For this reason, children are more susceptible to the effects of strontium than adults who have mature bone. (Agency for Toxic Substances and Disease Registry (ATSDR). 2004)

The THH criteria for strontium is calculated using the exposure assumptions found in Chapter 16 and the following toxicity data:

0.6 mg/kg-day - Oral RfD (reference dose) – IRIS
1 L/kg - Bioconcentration factor (BCF), Strontium Toxicological Profile, (Agency for Toxic Substances and Disease Registry – ATSDR, April 2004)
0.2 - default relative source contribution (RSC)

Based on the current toxicity data in IRIS and the Strontium Toxicological Profile, (ATSDR, April 2004) the Department is recommending that the EQB propose a human health criterion of 4200 ug/L.

1,2,4 and 1,3,5 Trimethylbenzene (TMB)

TMB is a byproduct from the petroleum refining process. It is also used as a solvent in coatings; cleaners; pesticides and inks. The TMB's are lipophilic and tend to accumulate in fatty tissue. Most of the chemical will adhere to red blood cells. TMB is labeled a central nervous system depressant. Once metabolized, TMB has been shown to cause anemia, asthmatic bronchitis, alterations in blood clotting. (US EPA OPP August 1994)

The toxicity data used to calculate 1,2,4 -TMB and 1,3,5 - TMB was obtained from the EPA Risk Assessment Program Tier 2, Provisional Peer-Reviewed Toxicity Value (PPRTV) assessment. The Department calculated threshold human health criteria for 1,2,4 and 1,3,5 trimethylbenzene based on toxicity data from a PPRTV, which was obtained from a peer-reviewed, Risk Assessment Issue Paper, *Derivation of a Provisional RfD for 1,2,4-Trimethylbenzene (CASRN 95-63-6) and 1,3,5-Trimethylbenzene (CASRN 108-67-8)*) and the Risk Assessment Information System (RAIS – 6/30/99). In the PPRTV risk assessment paper it was determined that the structure of 1,2,4- and 1,3,5-TMB is similar, therefore the two isomers can be used as surrogates for the other. The same toxicity data was therefore used to calculate the human health criteria for each.

The threshold human health (THH) criteria for 1,2,4 –TMB and 1,3,5-TMB was calculated using the exposure assumptions found in Chapter 16 and the following toxicity data:

.05 mg/kg-day - Oral RfD (reference dose) - Risk Assessment Information System (RAIS)
439 L/kg - Bioconcentration factor (BCF), US EPA OPP, Chemical Summary for TMB, (EPA 749-F-94-022a)
0.2 - default relative source contribution (RSC)

The Department is recommending that the EQB propose to adopt the calculated human health criteria for both 1,2,4 TMB (72 ug/L) and 1,3,5 TMB (72 ug/L).

REFERENCES USED IN THIS EVALUATION:

General Reference:
IRIS (US EPA, Integrated Risk Information System) A-Z list of substances
http://cfpub.epa.gov/ncea/iris/index.cfm?fuseaction=iris.showSubstanceList&list_type=alpha

EPA's *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health – 2000.* (EPA-822-B-00-004)

25 Pa Code Chapter 16 Water Quality Toxics Management Strategy – Statement of Policy. Commonwealth of Pennsylvania.

U.S. Environmental Protection Agency (1994). Water Quality Standards Handbook. Second Edition. EPA 823-0-94-005A, August, 1994.

Chemical-Specific References:

Acrolein and Phenol - May, 2009 Human health criteria (EPA-822-F-009-001).
Acrylamide – EPA IRIS
Acrylamide - Chemical Summary, (1994) US EPA Office of Pollution Prevention and Toxics, (EPA – 749-F-94-005a)
Benzyl chloride – EPA IRIS
2-butoxyethanol – EPA IRIS
2-butoxyethanol – ATSDR, Toxicity Profiles (tp118-c5[1].pdf)
cis-1,2-dichloroethylene (DCE) – IRIS
cis-1,2-DCE – BCF, (US EPA, National Primary Drinking Water Regulations Technical Factsheet on cis-1,2-DCE)
Cyclohexylamine – IRIS
Cyclohexylamine – US EPA, Health and Environmental Effects Document for cyclohexylamine, Office of Health and Environmental Assessment, 500ECAOCING017
Resorcinol – Concise International Chemical Assessment Document 71, 2006, United Nations Environment Programme, the International Labour Organization, the World Health Organization.
Resorcinol, Data Analysis and Test Plan for, (May 2004), INDSPEC Chemical Corporation.
Strontium – EPA IRIS
Strontium, Toxicological Profiles, ATSDR, April 2004
1,2,4 and 1,3,5 Trimethylbenzene:
Risk Assessment Issue Paper for: *Derivation of a Provisional RfD for 1,2,4-Trimethylbenzene (CASRN 95-63-6) and 1,3,5-Trimethylbenzene (CASRN 108-67-8)*) and the Risk Assessment Information System (RAIS – 6/30/99).
Chemical Summary for TMB, US EPA OPP August 1994 (EPA 749-F-94-022a)

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

RATIONALE FOR RECOMMENDED IMPROVEMENT TO THE PUBLIC NOTIFICATION METHODS ASSOCIATED WITH THE STREAM REDESIGNATION PROCESS

SUMMARY

The Department recommends an improvement to the public notification methods associated with the stream redesignation process found at §93.4d. The Department will continue to publish in the *Pennsylvania Bulletin*, a notice of receipt of petition, or assessment of waters, for High Quality or Exceptional Value Waters redesignation. This notice in the *Pennsylvania Bulletin* is the primary public notification method and will always be done along with the most appropriate secondary public notification method. The Department needs to have the flexibility to be able to select the most effective secondary public notification method. Currently, the Department is required to publish these notices in a local newspaper of general circulation. There are many possible options that the Department could use as the secondary public notification method regarding the stream redesignation process (including, but not limited to posting the information on the Department's website; issuing press releases through the Department's newsroom; distributing the information via email notification and list-serve applications; correspondence delivered by the United States Postal Service; and publication in newspapers). This added flexibility will enable the Department to provide public notifications more effectively, while being judicious of the monetary expense and the amount of staff time involved with this procedure.

PREAMBLE

The Department recommends improvements to the public notification methods associated with the stream redesignation process. The Department is required by regulation found at 25 Pa Code; Section 93.4d to publish either a notice of receipt of a complete petition, which has been accepted by the EQB recommending a High Quality or Exceptional Value Waters redesignation (petition receipt notice), or a notice of the Department's intent to assess surface waters for potential redesignation as High Quality or Exceptional Value Waters (assessment notice). The Department is currently obligated to publish either the petition receipt notice or the assessment notice in both the *Pennsylvania Bulletin* and a local newspaper of general circulation. The primary public notification method is publication in the Pennsylvania Bulletin and the secondary public notification method is publication in local newspapers of general circulation. We are

adhering to this regulation by publishing assessment notices in the *Pennsylvania Bulletin* (primary public notification method) and in local newspapers of general circulation (secondary public notification method). These assessment notices further request submission of information concerning the water quality of the waters subject to the evaluation, or to be assessed, for use by the Department to supplement any studies which have been performed.

The Department needs to have flexibility in selecting the secondary public notification method. There are many methods that the Department could select from to use as a secondary public notification method, rather than just local newspapers, if the Department had the legal flexibility to choose. These potential secondary public notification methods include, but are not limited to posting the information on the Department's website; issuing press releases through the Department's newsroom; distributing the information via email notification and list-serve applications; correspondence delivered by the United States Postal Service; and publication in newspapers. This legal flexibility will grant the Department the ability to choose a method that best conveys the information and also allows Department staff to be more judicious of the monetary expense and the amount of staff time allocated to this procedure.

The Department is completely committed to providing notification to the public regarding its activities and encourages public involvement. As an example of this commitment, the Department has been voluntarily publishing notices in local newspapers when a proposed stream redesignation rulemaking has been published in the *Pennsylvania Bulletin* (proposed rulemaking notice) in addition to the required assessment notices. This proposed rulemaking notice announces the open period for public comment.

For comparison, the Department currently posts both assessment notices and proposed rulemaking notices on its website. Posting these notices on the Department website involves just a few minutes of staff time at no further cost, versus the hours of time involved with coordinating the publication of a newspaper notice and the additional expense. The cost to the Department for inserting these assessment and proposed rulemaking notices into local newspapers of general circulation for 2010 was $9,673.83. Upon publication of this final rulemaking, the BWSFR will have the flexibility to display these notices on the Department's official website, rather than being obligated to place legal advertisements in local newspapers of general circulation. These notices will remain available on the website indefinitely as opposed to a single day insertion into a newspaper. The ubiquitous nature of the internet coupled with a longer period of availability ensures that the notification will be disseminated to a much larger audience than a one day notification in a local newspaper of general circulation currently provides. The audience will not be limited to those few individuals in the local distribution area of the newspaper who read the legal advertisements on any particular day. Additionally, more information and specific details can be made available on the Department website, along with links to other pertinent material. The Department recommends that § 93.4d be amended according to Annex A in order to improve public notification associated with the stream redesignation process. This added flexibility will enable the Department to select the best method to provide public notifications, while being judicious of the monetary expense and the amount of staff time involved with this procedure.

ANNEX

§ 93.4d. Processing of petitions, evaluations and assessments to change a designated use. (a) Public notice of receipt of **[evaluation]** **petition**, or assessment of waters, for High Quality or Exceptional Value Waters redesignation. The Department will publish in the *Pennsylvania Bulletin* and **[in a local newspaper of general circulation]** **by other means designed to effectively reach a wide audience,** notice of receipt of a complete **[evaluation]** **petition** which has been accepted by the EQB recommending a High Quality or Exceptional Value Waters redesignation, or notice of the Department's intent to assess surface waters for potential redesignation as High Quality or Exceptional Value Waters. The assessments may be undertaken in response to a petition or on the Department's own initiative. The notice will request submission of information concerning the water quality of the waters subject to the evaluation, or to be assessed, for use by the Department to supplement any studies which have been performed. The Department will send a copy of the notice to all municipalities containing waters subject to the **[evaluation]** **petition** or assessment.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

RATIONALE FOR THE DEVELOPMENT OF AMBIENT WATER QUALITY CRITERIA

RESORCINOL & SULFONIC ACID COMPOUNDS

(Revised February 2012)
(Revised February 2013)

Introduction:

Beazer East, Inc. (Beazer) implemented environmental investigations and remediation at sites in Butler and Armstrong Counties, Pennsylvania in cooperation with the Department of Environmental Protection (Department) and United States Environmental Protection Agency (U.S. EPA). These sites are located within an area approximately 60 square miles in size that has been designated by the Department under the Hazardous Sites Cleanup Act (HSCA) as the "Bear Creek Area Chemical Site" (BCACS). The Department has determined that environmental media (i.e. soil and groundwater) within the BCACS have been impacted by sulfonate (sulfonic acid) compounds and resorcinol and other hazardous substances. The sulfonic acid compounds include meta-benzene disulfonic acid (m-BDSA), benzene monosulfonic acid (BSA), p-phenol sulfonic acid (p-PSA).

Currently, with respect to surface water, there are no ambient water quality criteria for the sulfonic acids or resorcinol, which are needed to evaluate the environmental clean-up objectives and progress within the BCACS.

EPA and Department Review Aquatic Life Water Quality Criteria Developed by AMEC:

Because water quality criteria had not been developed for the sulfonic acids or resorcinol by either the Department or the U.S. EPA, AMEC Earth & Environmental (AMEC) used U.S. EPA's national guidelines to develop aquatic life water quality criteria (Stephan, et al., 1985) in accordance with 25 Pa. Code § 16.22. (AMEC. April 2008). The AMEC studies included a comprehensive review of relevant literature and existing toxicity data. These studies also required that a series of acute and chronic toxicity tests be conducted since there was insufficient existing toxicity data available to meet U.S. EPA's established minimum data requirements for aquatic life criteria development. AMEC used a variety of U.S. EPA and/or ASTM approved methods and protocols for conducting the different series of biotoxicity tests, depending on what was determined to be appropriate for the particular species being tested.

The Department reviewed the documentation developed by AMEC. U.S. EPA performed an informal review of this documentation, and the process used by AMEC. Based on comments

forwarded to the Department from the U.S. EPA's Health and Ecological Criteria Division in the EPA Office of Science and Technology, it was determined that AMEC followed the U.S. EPA National Guidelines on toxicity testing and criteria development. However, based on a more thorough review of the calculations and data tables, U.S. EPA provided additional recommendations to correct errors found in some reported values. AMEC revised its ambient water quality report at the request of Beazer, and updated the report titled "Development of Ambient Water Quality Criteria for Benzene Metadisulfonic Acid, Benzene Monosulfonic Acid, p-Phenol Sulfonic Acid and Resorcinol" (AMEC. 2008). This updated report, dated April 3, 2008, incorporates revisions based on recommendations provided by the U.S. EPA and Department.

Based on the results of the studies presented by AMEC on behalf of Beazer, and the U.S. EPA and Department's review and recommended revisions, the Department proposed the following site-specific ambient water quality criteria for sulfonic acids and resorcinol. These criteria were used to calculate effluent limits for permitted facilities within the BCACS located within Bear Creek basin (§93.9s), in Armstrong and Butler Counties:

Compound	CAS Number	Acute AWQC Criterion Maximum Concentration (ug/l)	Chronic AWQC Criterion Continuous Concentration (ug/l)	Human Health Criteria (ug/L)	Health Effect
Benzene Metadisulfonic Acid	00098486	2592000	1620000	N/A	H
Benzene Monosulfonic Acid	00098113	1956000	1151000	N/A	H
p-Phenol Sulfonic Acid	00098679	3476000	1363000	N/A	H
Resorcinol	01084603	28000	7180		H

Analytical Test Method Requirements:

Because there are no EPA approved analytical methods for benzene metadisulfonic acid, benzene monosulfonic acid and p-phenol sulfonic acid (sulfonates), the Department published a request in the Pennsylvania Bulletin on May 23, 2009 (39 PaB 2594) seeking analytical test methods, data and pertinent scientific information concerning these sulfonic acid compounds.

The Department's Bureau of Laboratories (BOL) reviewed the responses to the May 2009 Pa Bulletin notice "Request for Scientific Information; Resorcinol and Sulfonates." Two responses were received. One is from the law firm that represents Beazer. This respondent provided the analytical method development pathway used by Beazer (and its subcontractors) since 1990. The other response was from Test America, the laboratory that is currently providing testing

services to Beazer, and also included a brief summary of the analytical methodology currently in use by them for these compounds.

In the absence of an EPA approved analytical test method for the sulfonic acids and resorcinol, the Department is requiring that analytical laboratories apply for and obtain accreditation in accordance with 25 Pa Code Chapter 252 prior to accepting and analyzing samples for these compounds, if required to do so as a permit requirement. Currently, the Department's Laboratory Accreditation Program has approved the Test America Method OR357A - DETERMINATION OF RESORCINOL and BENZENESULFONIC ACIDS BY LIQUID CHROMATOGRAPHY-TANDEM MASS SPECTROMETRY (LCMS/MS) USING MULTIPLE REACTION MONITORING (MRM).

Department's Development of Human Health Criteria - Resorcinol:

In addition, the Department developed an ambient water quality criterion for the protection of human health for resorcinol since it was discovered during this evaluation of water quality criteria that human health is the most sensitive use and sufficient data is available for the development of such human health criteria.

Water quality criteria had not been developed for resorcinol by either the Department or the U.S. EPA. Under the Department's statement of policy, when no criteria have been developed for a substance identified or expected in a discharge, the Department will develop criteria following EPA's standard toxicological procedures outlined in the Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (EPA-822-B-00-004, October 2000) and the *National Recommended Water Quality Criteria* (EPA-822-H-04-001, 2004), as amended and updated or Exhibit 3-1 of the *Water Quality Standards Handbook, Second Edition, EPA 823-0-94-005A, August, 1994*, as amended and updated."

EPA's toxicological procedures have been updated as reflected in the *EPA Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health – 2000.* The Department therefore, calculated a threshold human health criterion using EPA's updated methods, and toxicity data from *Resorcinol – Concise International Chemical Assessment Document 71*, which was published in 2006 under the United Nations Environment Programme, the International Labour Organization, and the World Health Organization. The Department also used information from the *Data Analysis and Test Plan for Resorcinol,* INDSPEC Chemical Corporation, (May 2004).

The human health criterion for resorcinol (3400 ug/L) was developed using the following equation, variables, and sources of data:

AWQC (ug/L) = NOAEL/ UF x RSC x (BW/DI + (FI x BCF)) x 1000, where:

- **RfD Equivalent** for resorcinol – **NOAEL/UF** (0.5 mg/kg-day)
    - **NOAEL** – No Observed Adverse Effect Level (50 mg/kg-day) (*Concise International Chemical Assessment Document 71,* 2006)
    - **UF** – Uncertainty factor (100, 10 –intra species, 10 – inter species variations) (*Concise International Chemical Assessment Document 71,* 2006)

- **RSC** – Relative Source Contribution - .20 (Accounts for the non-water sources of exposure.) (EPA, 2000)
- **BCF** – Bioconcentration Factor – 3.162.0 L/kg (INDSPEC Chemical Corporation)
- **BW** – Body weight (70 kg) (25 Pa Code § 16.32(b))
- **DI** – Drinking Water Intake (2.0 Liter) (25 Pa Code § 16.32(b))
- **FI** – Fish consumption Rate (17.5 g-day) (EPA, 2000 & 25 Pa Code § 16.32(b))

The Department submitted its criteria development rationale, which includes the additional human health criterion that is based on the reference in question, *Resorcinol – Concise International Chemical Assessment Document 71* (WHO. 2006), and the *Data Analysis and Test Plan for Resorcinol,* INDSPEC Chemical Corporation, (May 2004) to U.S. EPA for approval of the study and the methodology used to calculate the human health criterion for resorcinol. Based on U.S. EPA's review of this rationale and the *Resorcinol – Concise International Chemical Assessment Document 71* (WHO. 2006) document, U.S. EPA agreed that the Department used the appropriate methods and equation, but recommended using a NOAEL of 36 mg/kg-day based on the toxicity data, which calculates to an RfD of 0.4mg/kg-day. Therefore, the updated resorcinol criterion is **2700 ug/L.**

Summary of Criteria Development

Based on the results of the aquatic life studies presented by AMEC on behalf of Beazer, the Department's development of human health criteria for resorcinol, using established U.S. EPA protocols and the most current scientific information and data, and an on-going cooperative review of the Department's criteria development activities by U.S. EPA, the Department is proposing the following ambient water quality criteria for the sulfonic acids and resorcinol.

Compound	CAS Number	Acute AWQC Criterion Maximum Concentration (ug/l)	Chronic AWQC Criterion Continuous Concentration (ug/l)	Human Health Criteria (ug/L)	Health Effect
Benzene Metadisulfonic Acid	00098486	2600000	1600000	N/A	
Benzene Monosulfonic Acid	00098113	2000000	1200000	N/A	
p-Phenol Sulfonic Acid	00098679	3500000	1400000	N/A	
Resorcinol	01084603	28000	7200	2700	H

Upon approval these criteria will be placed in 25 Pa. Code Chapter 93, Table 5 (relating to water quality criteria for toxic substances).

References

25 Pa Code Chapter 16 Water Quality Toxics Management Strategy – Statement of Policy. Commonwealth of Pennsylvania.

AMEC Earth & Environmental 2008. Development of Ambient Water Quality Criteria for Benzene Metadisulfonic Acid, Benzene Monosulfonic Acid, p-Phenol Sulfonic Acid and Resorcinol (AMEC April 3, 2008).

INDSPEC Chemical Corporation (May 2004). *Data Analysis and Test Plan for Resorcinol.*

Stephen, Charles, et al. (1985). *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses.*

United Nations Environment Programme, the International Labour Organization, and the World Health Organization (2006). *Resorcinol – Concise International Chemical Assessment Document 71.*

U.S. Environmental Protection Agency (2000). *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health – 2000.* EPA-822-B-00-004 October, 2000.

Section 93.9a to 93.9z (Drainage Lists)

Section 93.9a to 93.9z is a comprehensive list of designated uses for all of the waters of the Commonwealth.

Changes to 25 Pa Code 93.9 that are included along with this Triennial Review of Pennsylvania's Water Quality Standards will:

- Correct use designations and stream entries found in Drainage Lists
- Provide clarification or correct specific errors
- NOT change the original regulatory intent of the code

These changes include updates, revisions, corrections for typographical and translational errors, insertions for missing or misplaced entries, and corrections to references associated with prior rulemaking and/or publication activities

Triennial 2013 - CORRECTIONS to CHAPTER 93.9 A to Z

Stream	County	List	Proposed Correction
Lackawaxen River	Wayne & Pike	B	Correct the entire drainage list B to account for newly named tributaries. Also update the name of the Lackawaxen River between Van Auken Creek and Dyberry Creek.
Leas Run	Monroe	C	Insert Leas Run. It should appear as a named tributary.
Paradise Creek basin	Monroe	C	Correct Paradise Creek basin by converting it from a main stem format to a basin format. This will address the following 3 errors: Tank Creek (04990) is not listed; Forest Hills Run should be listed rather than Swiftwater Creek.; Devils Hole Creek should be listed after Yankee Run.
Pocono Creek basin	Monroe	C	Corrections are being made to the headwaters of Pocono Creek basin to be consistent with the NHD Flowline. The origin of Pocono Creek and the mouths of Wolf Swamp Run and Dry Sawmill Run are all now further downstream. Additionally, the Pocono Creek basin is being converted from a main stem format to a basin format to account for named tributaries that are not currently listed in Chapter 93.
McMichaels Creek	Monroe	C	Correct the name to McMichael Creek
Slateford Creek	Northampton	C	Correct the Township Road Number in the zone description to T735
Black Creek	Northampton	D	Correct the name to Black River
Lahaska Creek	Bucks	E	Confluence of Lahaska Creek & Watson Creek forms the origin of Mill Creek
Leaf Creek	Berks	F	Insert Leaf Creek. It should appear as a named tributary.
Crossmans Run	Montgomery	F	Insert Crossmans Run. It should appear as a namd tributary.
Glanraffan & Matsunk Creeks	Montgomery	F	Schuylkill River below Valley Creek will be re-written as a basin format. These 2 named tribs will be included with this new format.
East Branch White Clay Branch	Chester	G	Correct the name to East Branch White Clay Creek
UNTs to W Br Brandywine Creek	Chester	G	Change zone description to "Basins, all portions in West Brandywine Township". All portions of all tributaries to the West Branch Brandywine Creek that lie within the West Brandywine Township borders are HQ-TSF, MF.

Triennial 2013 - CORRECTIONS to CHAPTER 93.9 A to Z (Continued)

Stream	County	List	Proposed Correction
"Catlin Hollow"	Tioga	H	Change all reference from "Catlin Hollow" to Norris Brook. "Catlin Hollow" is a tributary to Norris Brook.
Tributaries of Towanda Creek	Bradford	I	Insert named tributaries that were inadvertently omitted. These include Beech Flats Creek, Wallace Brook, Gulf Brook, and French Run.
Sechler Run	Montour	K	Sechler Run is no longer a tributary to the Susquehanna River. It has been diverted and it is now a tributary to Mahoning Creek.
Tributaries of Susquehanna River	Montour - Northumberland	K	Insert named tributaries that were inadvertently omitted. These include Gaskins Run, Kipps Run, Raups Run, and Packers Run.
Grass Flats Run	Clinton	L	Correct the name to Wistar Run
Roaring Brook	Tioga	L	Correct the name to Roaring Branch
Noon Branch Wolf Run	Lycoming	L	NHD Flowline now categorizes Noon Branch as flowing all the way down to Plunketts Creek. The main stem and the tributary should be reversed. Noon Branch is the main stem and Wolf Run is the tributary.
Penns Creek		M	Delete the stray entry for Penns Creek
Zerbe Run	Northumberland	M	The mouth of Zerbe Run is located in Northumberland County (not Schuylkill County)
Deep Hollow Run	Bedford	N	Pavia Run' should replace 'Deep Hollow Run'. Deep Hollow Run is a tributary to Pavia Run according to PA stream directory & NHD Flowline. Error originated with the Rattling Run Package (November 1993)
Keasey Run & Rowe Run	Franklin	O	Keasey Run and Rowe Run do not directly enter the Conodoguinet Creek as indicated in Drainage List O. Both of these streams are tributaries to Muddy Run.
Tributaries to South Branch Codorus Creek	York	O	Convert Ch 93 from a main stem to a basin format so that the tributaries to South Branch Codorus Creek are listed in the correct order. Update the RMI for the UNT that flows through Glen Rock Valley to be consistent with NHD Flowline. Fix zone description for UNTs to East Branch Codorus Creek below the inlet for Lake Redman.
Indian Spring Run	Chester / Lancaster	O	Indian Spring Run basin is in wrong location. Error originated with the Newtown Creek Package (January 2007).
Haines Run	Lancaster	O	Correct the name to Haines Branch
Pent Run	Clearfield	S	Correct the name to Pentz Run
North Fork Redbank Creek basin	Jefferson	S	Convert the North Fork Redbank Creek from a main stem format to a basin format. This will account for (1) those named tributaries which do not appear in Chapter 93; (2) streams that are not in the correct order in the drainage list; and (3) instances where the stream names are inconsistent between Ch 93.9 and NHD Flowline.
Boothe Run	Greene	W	Delete the entry for Boothe Run. With respect to hydrological order, Boothe Run is a fifth level tributary to UNT 32753. All portions of the basins of the unnamed tributaries to Enlow Fork that flow through Pennsylvania are designated WWF. The basin of UNT 32753, including Boothe Run is designated WWF according to the previous entry.
Antietam Creek & Monocacy River		Z	Language is being added to Chapter 93.9z to clarify those streams that are tributary to the Monocacy River.

CDL-1

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
ENVIRONMENTAL QUALITY BOARD

(AGENCY)

DOCUMENT/FISCAL NOTE NO. 7-475

DATE OF ADOPTION APRIL 16, 2013

BY

TITLE E. CHRISTOPHER ABRUZZO
ACTING CHAIRMAN

EXECUTIVE OFFICER CHAIRMAN OR SECRETARY

Copy below is hereby approved as to form and legality
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BY

SHAWN E. SMITH

APR 26 2013
DATE OF APPROVAL

(Deputy General Counsel)
(~~Chief Counsel - Independent Agency~~)
(Strike inapplicable title)

☐ Check if applicable. No Attorney General Approval or objection within 30 days after submission.

NOTICE OF FINAL RULEMAKING

DEPARTMENT OF ENVIRONMENTAL PROTECTION
ENVIRONMENTAL QUALITY BOARD

Triennial Review of Water Quality Standards

25 *Pa. Code,* Chapter 93

NOTICE OF FINAL RULEMAKING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ENVIRONMENTAL QUALITY BOARD
[25 PA. Code, Chapter 93]

Triennial Review of Water Quality Standards

Order

The Environmental Quality Board (Board) is amending *25 Pa. Code* Chapter 93 (relating to water quality standards) as set forth in Annex A.

This order was adopted by the Board at its meeting of April 16, 2013.

A. Effective Date

These amendments will be effective upon publication in the *Pennsylvania Bulletin* as final-form rulemaking.

B. Contact Persons

For further information contact Rodney A. Kime, Chief, Division of Water Quality Standards, Bureau of Point and Non-Point Source Management, 11th Floor, Rachel Carson State Office Building, P.O. Box 8774, Harrisburg, PA 17105-8774, (717) 787-9637 or Michelle Moses, Assistant Counsel, Bureau of Regulatory Counsel, 9th Floor, Rachel Carson State Office Building, P.O. Box 8464, Harrisburg, PA 17105-8464, (717) 787-7060. Persons with a disability may use the AT&T Relay Service by calling (800) 654-5984 (TDD users) or (800) 654-5988 (voice users). This proposal is available electronically through the Department of Environmental Protection's (Department) website (http://www.dep.state.pa.us).

C. Statutory Authority

The final rulemaking is made under the authority of Sections 5(b)(1) and 402 of The Clean Streams Law (35 P.S. §§ 691.5(b)(1) and 691.402), which authorizes the Board to develop and adopt rules and regulations to implement provisions of The Clean Streams Law and Section 1920-A of The Administrative Code of 1929 (71 P.S. § 510-20), which grants to the Board the power and duty to formulate, adopt and promulgate rules and regulations for the proper performance of the work of the Department. In addition, Section 303 of the Federal Clean Water Act (33 U.S.C.A. § 1313) sets forth requirements for water quality standards and the Federal regulations in 40 CFR 131.41 (relating to Bacteriological criteria for those states not complying with Clean Water Act section 303(i)(1)(A)) sets forth bacteria criteria for coastal recreation waters in the Commonwealth.

D. Background and Summary

Section 303(c)(1) of The Clean Water Act requires that states periodically, but at least once every three years, review and revise as necessary, their water quality standards. This regulation constitutes Pennsylvania's current triennial review of its water quality standards.

Pennsylvania's water quality standards, which are codified in Chapter 93 and portions of Chapter 92a, are designed to implement the requirements of Section 5 and 402 of The Clean Streams Law and Section 303 of the Federal Clean Water Act (33 U.S.C.A. § 1313). The water quality standards consist of the designated and existing uses of the surface waters of this Commonwealth, along with the specific numeric and narrative criteria necessary to achieve and maintain those uses, and an antidegradation policy. Thus, water quality standards are instream water quality goals that are implemented by imposing specific regulatory requirements, such as treatment requirements, best management practices, and effluent limitations, on individual sources of pollution.

This final rule will revise the Chapter 93 (Water Quality Standards) regulations. These regulatory revisions will clarify requirements and update the regulations to be consistent with federal guidance where indicated. This regulation may affect persons who discharge wastewater into surface waters of the Commonwealth or otherwise conduct activities, which may impact such waters.

Part of the triennial review requires that states reexamine water body segments that do not meet the fishable or swimmable uses specified in Section 101(a)(2) of the Federal Clean Water Act. DEP evaluated the two Pennsylvania water bodies where the uses are not currently met, including: (1) the Harbor Basin and entrance channel to Outer Erie Harbor/Presque Isle Bay (Drainage List X, § 93.9x) and (2) several zones in the Delaware Estuary (Drainage Lists E and G, §§ 93.9e and 93.9g).

The swimmable use designation was deleted from the Harbor Basin and entrance channel demarcated by U.S. Coast Guard buoys and channel markers on Outer Erie Harbor/ Presque Isle Bay because pleasure boating and commercial shipping traffic pose a serious safety hazard in this area. This decision was further supported by a Use Attainability (UAA) study conducted by the Department of Environmental Resources (DER) in 1985. Because the same conditions and hazards exist today, no change to the designated use for Outer Erie Harbor/Presque Isle Bay is proposed in the final rulemaking.

In April 1989 DER cooperated with the Delaware River Basin Commission (DRBC), the U.S. Environmental Protection Agency (EPA) and other DRBC signatory states on a comprehensive UAA study in the lower Delaware River and Delaware Estuary. This study resulted in appropriate recommendations relating to the swimmable use, which DRBC included in water use classifications and water quality criteria for portions of the tidal Delaware River in May 1991. The appropriate DRBC standards were referenced in Sections 93.9e and 93.9g (Drainage Lists E and G) in 1994. The primary water-contact use remains excluded from the designated uses for river miles 108.4 to 81.8 because of continuing significant impacts from combined sewer overflows, and hazards associated with commercial shipping and navigation.

The Department discussed the proposed triennial rulemaking with the Water Resources Advisory Committee (WRAC) five times in 2011, including at the committee's April, June, July, October and December 2011 meetings. On January 11 2012, WRAC voted to present the proposed rulemaking package to the Board. The Agricultural Advisory Board declined the need for their consideration on the proposed triennial review of water quality standards that was scheduled for its regular October 19, 2011 meeting.

The regulation was adopted by the 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 commenters including testimony from two witnesses at the public hearing. The comments received on the proposed regulation are summarized in Section E below.

The Board has considered all of the public comments received on its proposed rulemaking in preparing this final regulation. 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 draft final regulation was discussed with WRAC at its November 28, 2012 meeting. WRAC approved the final rulemaking and recommended the Department present the final rulemaking to the Board for adoption.

E. Summary of Responses to Comments and Changes to the Proposed Rulemaking

As a result of the public hearing and public comment period, the Board received comments from 197 commentators including the Independent Regulatory Review Commission (IRRC) and the U.S. Environmental Protection Agency (EPA Region 3). The majority of commentators expressed opposition to the proposed water quality criteria for molybdenum, sulfates and chlorides. Specifically, commentators questioned whether the statewide criteria for these contaminants would impact the economy and regulated community and also questioned the scientific studies the Department relied upon in the development of the criteria. Commentators also requested that the Department perform additional instream monitoring and provide further justification on the need for the proposed statewide criteria for molybdenum, sulfates and chlorides.

A more detailed summary of the comments submitted to the Board and the Department's responses to those comments are available in the Report to the Environmental Quality Board Comment and Response Document (February 2013).

A detailed description of the revisions to the Chapter 93 proposal follows:

§ 93.4d. Processing of petitions, evaluations, and assessments to change a designated use.

The Board received a comment requesting that all property owners affected by a potential stream redesignation be directly notified of the petition and assessment.

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 (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.

§ 93.7. Specific water quality criteria.

Chloride – There were several comments received by the Board in opposition to the chloride aquatic life equation-based criterion. The Board is withdrawing the proposed equation-based aquatic life criteria for chloride, including both the acute and chronic equations.

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 ongoing 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 aquatic species. The ion matrices could be most problematic in the Commonwealth's calcium dominated limestone streams or where the source of chlorides is other than sodium chloride.

The Department is now aware of several studies currently being undertaken to determine chloride toxicity. The Canadian Council of Ministers of the Environment released guidelines for chloride criteria development in 2011. The Stroud Water Research Center also 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 before adopting a standard, but that it must be done in a timely manner. By a majority vote of 13 to 0 with 1 abstention, WRAC passed the following motion at its November 28, 2012, meeting, encouraging the Department to continue working on chloride criteria: "WRAC encourages DEP to continue evaluating the chloride criteria with the goal of proposing new criteria preferably prior to the next Triennial review."

Dissolved Oxygen – On final rulemaking, the Board is revising the proposed language in DO_1 to provide clarity to where §93.7(b) should be applied. Specifically, the clause "applied in accordance with (b)" is moved so that it is clear that both the 7-day average and minimum criteria for naturally reproducing salmonids should be applied in accordance with §93.7(b).

The Board would like to further clarify that the final regulations for dissolved oxygen criteria apply to flowing, freshwater and the epilimnion of naturally stratified lakes, ponds or impoundments. It should be noted that these dissolved oxygen criteria apply to the tidal portions of the Delaware River and its tributaries since the tidal portions within Pennsylvania contain predominantly freshwater biological communities.

Also, in response to a comment received by the Board, it is changing the word "Salmonid" to "salmonid", since the word is no longer a proper noun and does not need to be capitalized.

Sulfate – The Board is withdrawing 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 led to the development of the proposed equation-based sulfate criteria. Dr. Soucek and other leading researchers cautioned that although the toxicological results supporting the proposed sulfate criterion are valid, the test conditions used in the toxicity tests, which led to the development of the sulfate criterion, may not be applicable to all the Commonwealth's waters. The ionic composition of the test water compared to the natural ionic composition of portions of Pennsylvania's waters differs and that difference is the cause for concern. Sodium (Na^{2+}) was the dominant cation associated with the sulfate (SO_4^{2-}) anion under the test conditions. In Pennsylvania streams, natural Sodium (Na^{2+}) concentrations are low while calcium (Ca^{2+}) and Magnesium (Mg^{2+}) are more prevalent.

It has been demonstrated that varying the cations affects the toxicity of the sulfate anion in solution. This toxicity difference in response to ionic composition leads to doubts regarding whether the proposed 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.

Although the Board is withdrawing the sulfate proposed criteria, the Department will continue to monitor the quantities of sulfate discharged from various sources and measure stream concentrations while reviewing the developing science on sulfate.

Temperature – The Board is removing the rate of temperature change language from this section. A rate of temperature change provision remains applicable in Chapter 96, Section 96.6 to help control adverse impacts that may result from rapid changes in temperature. The Department continues to be interested in evaluating new science that pertains to a rate of temperature change to protect aquatic organisms.

§ 93.8c. Human health and aquatic life criteria for toxic substances.

1,4-Dioxane – Based on comments received that a statewide criterion is not warranted, the Board is removing the proposed statewide criterion. The Department will continue to evaluate 1,4-dioxane in Pennsylvania. Additionally, the Department will continue to develop site-specific criteria, as needed, using the best available science.

Molybdenum – The Board is removing the proposed statewide criterion for molybdenum based on comments received that a statewide criterion for molybdenum is not warranted. The Department will continue to evaluate molybdenum in Pennsylvania. Additionally, the Department will continue to develop site-specific criteria, as needed, using the best available science.

§ 93.8d. Development of site-specific water quality criteria.

In part (f)(1) the Board is adding language to this section to be consistent with the recent revisions in Chapter 92a. (relating to public notice of permit applications and draft permits; and public notice of public hearing). This change merely updates the cross references.

§ 93.9k. Drainage List K.

Staff from the Pennsylvania Fish and Boat Commission (PFBC) submitted comments during the 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. To be even broader, all tributaries to the (North Branch) Susquehanna River between Mahoning Creek and the West Branch Susquehanna River are CWF, MF. These four tributaries (Gaskins Run, Kipps Run, Raups Run, & Packers Run) 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.

After reviewing the history associated with designation in this watershed, all tributaries to the Susquehanna River, both named and unnamed, between Mahoning Creek and West Branch Susquehanna River will 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 as capitalized, bolded and underlined text in the Annex. A more complete discussion of the designation history can be found in the Report to the Environmental Quality Board: Comment and Response Document (February 2013).

F. Benefits, Costs and Compliance

Benefits - Overall, the Commonwealth, its citizens and natural resources will benefit from these recommended changes because they provide the appropriate level of protection in order to preserve the integrity of existing and designated uses of surface waters in this Commonwealth. Protecting water quality also provides economic value to present and future generations in the form of clean water for multiple water supply uses, recreational opportunities, and human health and aquatic life protection. It is important to realize all benefits and to ensure that activities that depend on surface water or that may affect its chemical, biological and physical integrity may continue in a manner that is environmentally, socially and economically sound.

Compliance Costs – The amendments to Chapter 93 may impose additional compliance costs on the regulated community. These regulatory changes are necessary to improve total pollution control. The expenditures necessary to meet new compliance requirements may exceed that which is required under existing regulations.

Persons conducting or proposing activities or projects must comply with the regulatory requirements relating to designated and existing uses. Persons expanding a discharge or adding a new discharge point to a stream could be adversely affected if they need to provide a higher level of treatment to meet the more stringent criteria for selected parameters. These increased costs may take the form of higher engineering, construction or operating costs for facilities. Treatment costs and best management practies are site-specific and depend upon the size of the discharge in relation to the size of the stream and many other factors. Therefore, it is not possible to precisely predict the actual change in costs. Economic impacts would primarily involve the potential for higher treatment costs for new or expanded discharges to streams that are redesignated. The initial costs from technologically improved treatments or best management practices may be offset over time by potential savings from and increased value of improved water quality.

Compliance Assistance Plan — The final regulations have been developed as part of an established program that has been implemented by the Department since the early 1980s. The revisions are consistent with and based on existing Department regulations relating to compliance.

The final regulations will be implemented, in part, through the National Pollutant Discharge Elimination System (NPDES) permitting program. No additional compliance actions are anticipated. Staff is available to assist regulated entities in complying with the regulatory requirements if questions arise.

Paperwork Requirements — The final regulations should have no significant paperwork impact on the Commonwealth, its political subdivisions, or the private sector.

G. Pollution Prevention

Water quality standards are a major pollution prevention tool because they protect water quality and designated and existing uses. The final regulations will be implemented through the Department's permit and approval actions. For example, the National Pollutant Discharge Elimination System (NPDES) bases effluent limitations and best management practices on the water uses of the stream and the water quality criteria necessary to protect and maintain those uses.

H. Sunset Review

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

I. Regulatory Review

Under Section 5(a) of the Regulatory Review Act (71 P.S. § 745.5(a)), on June 22, 2012, the Department submitted a copy of the proposed rulemaking published at 42 Pa.B. 4367 on July 7, 2012, to the Independent Regulatory Review Commission (IRRC) and to the Chairpersons of the Senate and House Environmental Resources and Energy Committees (Standing Committees) for review and comment.

Under Section 5(c) of the Regulatory Review Act (71 P.S. § 745.5(c)), IRRC and the House and Senate Committees were provided with copies of the comments received during the public comment period, as well as other documents when requested. In preparing the final-form rulemaking, the Department has considered all comments from IRRC, the House and Senate Committees and the public.

Under section 5.1(j.2) of the Regulatory Review Act (71 P.S. § 745.5a(j.2)), on _____, 2013, the final-form rulemaking was deemed approved by the House and Senate Committees. Under section 5.1(e) of the Regulatory Review Act, IRRC met on _____, 2013, and approved the final-form rulemaking.

J. Findings of the Board

The Board finds that:

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

(2) A public comment period was provided as required by law. In addition, a Board hearing was held. All comments were considered.

(3) This final-form rulemaking does not enlarge the purpose of the proposal published at 42 Pa.B. 4367.

(4) This final-form rulemaking is necessary and appropriate for administration and enforcement of the authorizing acts identified in Section C of this order.

K. Order of the Board

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

(a) The regulations of the Department, 25 PA Code Chapter 93, are amended by amending §§ 93.1, 93.4c, 93.4d, 93.7, 93.8b, 93.8c, 93.8d, 93.9b – 93.9i, 93.9k – 93.9o, 93.9s, 93.9w, 93.9z to read as set forth in Annex A, with ellipses referring to the existing text of the regulation.

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

(c) The Chairperson shall submit this order and Annex A to the Independent Regulatory Review Commission and the Senate and House Environmental Resources and Energy Committees as required by the Regulatory Review Act.

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

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

E. Christopher Abruzzo
Acting Chairperson
Environmental Quality Board

ANNEX A

TITLE 25. ENVIRONMENTAL PROTECTION
PART I. DEPARTMENT OF ENVIRONMENTAL PROTECTION
Subpart C. PROTECTION OF NATURAL RESOURCES
ARTICLE II. WATER RESOURCES

CHAPTER 93. WATER QUALITY STANDARDS

* * * * *

GENERAL PROVISIONS

§ 93.1. Definitions.

The following words and terms, when used in this chapter, have the following meanings, unless the context clearly indicates otherwise:

* * * * *

[*Critical use*—The most sensitive designated or existing use the criteria are designed to protect.]

* * * * *

Point source discharge—A pollutant source regulated under the National Pollutant Discharge Elimination System (NPDES) as defined in § **[92.1]** **92a.2** (relating to definitions).

* * * * *

ANTIDEGRADATION REQUIREMENTS

* * * * *

§ 93.4c. Implementation of antidegradation requirements.

* * * * *

(b) *Protection of High Quality and Exceptional Value Waters*

(1) *Point source discharges.* The following applies to point source discharges to High Quality or Exceptional Value Waters.

* * * * *

(ii) *Public participation requirements for discharges to High Quality or Exceptional Value Waters.* The following requirements apply to discharges to High Quality or Exceptional Value Waters, as applicable:

(A) The Department will hold a public hearing on a proposed new, additional or increased discharge to Exceptional Value Waters when requested by an interested person on or before the termination of the public comment period on the discharge.

(B) For new or increased point source discharges, in addition to the public participation requirements in §§ **[92.61, 92.63 and 92.65]** **92a.81, 92a.82, 92a.83, 92a.85** (relating to public **ACCESS TO INFORMATION; PUBLIC** notice of permit application and **DRAFT PERMITS;[,]** public **NOTICE OF PUBLIC** hearing; **[~~public access to information;~~]** and notice to other government agencies), the applicant shall identify the antidegradation classification of the receiving water in the notice of complete application in § **[92.61(a)]** **[~~92a.86~~]** **92a.82 (relating to notice of [~~issuance or final action on a~~] public notice of permit applications and draft permits)**.

* * * * *

(c) *Special provisions for sewage facilities in High Quality or Exceptional Value Waters.*

(1) *SEJ approval in sewage facilities planning and approval in High Quality Waters.* A proponent of a new, additional, or increased sewage discharge in High Quality Waters shall include an SEJ impact analysis as part of the proposed revision or update to the official municipal sewage facilities plan under Chapter 71 (relating to administration of sewage facilities planning program). The Department will make a determination regarding the consistency of the SEJ impact analysis with subsection (b)(1)(iii). The determination will constitute the subsection (b)(1)(iii) analysis at the National Pollutant Discharge Elimination System (NPDES) permit review stage under Chapter 92**a** (relating to National Pollutant Discharge Elimination System permitting, monitoring and compliance), unless there is a material change in the project or law between sewage facilities planning and NPDES permitting, in which case the proponent shall recommence sewage facilities planning and perform a new social or economic justification impact analysis.

* * * * *

§ 93.4d. Processing of petitions, evaluations and assessments to change a designated use.

(a) *Public notice of receipt of **[evaluation]** **petition**, or assessment of waters, for High Quality or Exceptional Value Waters redesignation.* The Department will publish in the *Pennsylvania Bulletin* and **[in a local newspaper of general circulation]** **by other means designed to effectively reach a wide audience,** notice of receipt of a complete **[evaluation]** **petition** which has been accepted by the EQB recommending a High Quality or Exceptional Value Waters redesignation, or notice of the Department's intent to assess surface waters for potential redesignation as High Quality or Exceptional Value Waters. The assessments may be undertaken in response to a petition or on the Department's own initiative. The notice will request submission of information concerning the water quality of the waters subject to the evaluation, or to be assessed, for use by the Department to supplement any studies which have been performed. The Department will send a copy of the notice to all municipalities containing waters subject to the **[evaluation]** **petition** or assessment.

* * * * *

§ 93.7. Specific water quality criteria.

(a) Table 3 displays specific water quality criteria and associated critical uses. The criteria associated with the Statewide water uses listed in § 93.4, Table 2 apply to all surface

waters, unless a specific exception is indicated in §§ 93.9a—93.9z. **These exceptions will be indicated on a stream-by-stream or segment-by-segment basis by the words "Add" or "Delete" followed by the appropriate symbols described elsewhere in this chapter.** Other specific water quality criteria apply to surface waters as specified in §§ 93.9a—93.9z. All applicable criteria shall be applied in accordance with this chapter, Chapter 96 (relating to water quality standards implementation) and other applicable State and Federal laws and regulations.

TABLE 3

Parameter	*Symbol*	*Criteria*	*Critical Use**
		* * * * *	
Chloride	Ch**[1]**	Maximum 250 mg/L	PWS
	[~~Ch2~~	**~~Shall not exceed, in freshwater, the concentration calculated (in mg/L) by the following equations:~~** **~~1 hour average Criteria Maximum Concentration (CMC) criterion:~~** **~~$CMC = 287.8(Hardness)^{0.205797}(Sulfate)^{0.07452}$~~** **~~4 day average Criteria Continuous Concentration (CCC) criterion:~~** **~~$CCC = 177.87(Hardness)^{0.205797}(Sulfate)^{0.07452}$~~** **~~Hardness (in mg/L as $CaCO_3$) and sulfate (in mg/L) values shall be based on receiving water natural quality.~~**	**~~CWF, WWF, TSF, MF]~~**
		* * * * *	
Dissolved Oxygen		The following specific dissolved oxygen criteria recognize the natural process of stratification in lakes, ponds and impoundments. These criteria apply to flowing **[waters]** **freshwater** and to the epilimnion of a naturally stratified lake, pond or impoundment. The hypolimnion in a naturally stratified lake, pond or impoundment is protected by the narrative water quality criteria in §93.6 (relating to general water quality criteria). For nonstratified lakes, ponds or impoundments, the dissolved oxygen criteria apply	

		throughout the lake, pond or impoundment to protect the critical uses.	
	DO_1	For flowing waters, **[minimum daily]** **7-day** average 6.0 mg/l; minimum 5.0 mg/l. **For naturally reproducing [S]salmonid early life stages, APPLIED IN ACCORDANCE WITH (b), 7-day average 9.0 mg/l; minimum 8.0 mg/l[, in accordance with (b)].** For lakes, ponds and impoundments, minimum 5.0 mg/l.	CWF **[HQ-WWF] [HQ-TSF]**
	DO_2	**[Minimum daily average 5.0 mg/l; minimum 4.0 mg/l.] 7-day average 5.5 mg/l; minimum 5.0 mg/l.**	WWF
	DO_3	For the period February 15 to July 31 of any year, **[minimum daily]** **7-day** average 6.0 mg/l; minimum 5.0 mg/l. For the remainder of the year, **[minimum daily]** **7-day** average **[5.0]** **5.5** mg/l; minimum **[4.0]** **5.0** mg/l.	TSF
	[DO_4	**Minimum 7.0 mg/l.**	**HQ-CWF]**
		* * * * *	
Sulfate	Sul[1]	Maximum 250 mg/L	PWS
	[Sul$_2$	**Shall not exceed the result of the appropriate hardness and chloride based conditional numeric limits (in mg/L sulfate) as described below. Hardness (in mg/L as $CaCO_3$) and chloride (in mg/L) values used in the determination of the sulfate water quality standard shall be based on receiving water natural quality.** **A.) 500 mg/L, if the hardness concentration is less than 100 mg/L, or chloride concentration is less than 5 mg/L.** **B.) The result of the following equations (in mg/L sulfate) when the hardness value is greater than or equal to 100 mg/L, but less than or equal to 500 mg/L:** **1.) if the chloride value is greater than or equal to 5 mg/L, but less than 25 mg/L:** **S = [-57.478 + 5.79 (hardness) + 54.163**	**CWF, WWF, TSF, MF]**

	~~(chloride)] * 0.65~~ ~~where, S = sulfate concentration; or~~ ~~2.) if the chloride value is greater than or equal to 25 mg/L:~~ ~~S = [1276.7 + 5.508 (hardness) - 1.457 (chloride)] * 0.65~~ ~~where, S = sulfate concentration~~ ~~C.) 2,000 mg/L, if the hardness concentration is greater than 500 mg/L and the chloride concentration is 5 mg/L or greater.~~	
Temperature	Maximum temperatures in the receiving water body resulting from heated waste sources regulated under Chapters **[92]** **92a**, 96 and other sources where temperature limits are necessary to protect designated and existing uses. **[~~Additionally, these wastes may not result in a change by more than 2°F during a 1-hour period.~~]** * * * * *	See the following table.

(b) [Table 4 contains specific water quality criteria that apply to the water uses to be protected. When the symbols listed in Table 4 appear in the Water Uses Protected column in § § 93.9a—93.9z, they have the meaning listed in the second column of Table 4. Exceptions to these standardized groupings will be indicated on a stream-by-stream or segment-by-segment basis by the words "Add" or "Delete" followed by the appropriate symbols described elsewhere in this chapter.

TABLE 4

Symbol	*Water Uses Protected*	*Specific Criteria*
WWF	**Statewide list**	**DO_2 and $Temp_2$**
CWF	**Statewide list plus Cold Water Fish**	**DO_1 and $Temp_1$**
TSF	**Statewide list plus Trout Stocking**	**DO_3 and $Temp_3$**
HQ-WWF	**Statewide list plus High Quality Waters**	**DO_1 and $Temp_2$**
HQ-CWF	**Statewide list plus High Quality Waters and Cold Water Fish**	**DO_4 and $Temp_1$**
HQ-TSF	**Statewide list plus High Quality Waters and Trout Stocking**	**DO_1 and $Temp_3$**
EV	**Statewide list plus Exceptional Value Waters**	**Existing quality]**

For naturally reproducing [S]salmonids, protected early life stages include: all embryonic and larval stages and all juvenile forms to 30 days after hatching. The DO_1 standard for naturally reproducing [S]salmonid early life stages shall apply during October 1 through May 31.

The DO_1 standard for naturally reproducing [S]salmonid early life stages applies unless it can be demonstrated to the Department's satisfaction, that the following conditions are documented: 1) the absence of young of the year [S]salmonids measuring less than 150 mm in the surface water; and 2) the absence of multiple age classes of [S]salmonids in the surface water. These conditions shall only apply to Salmonids resulting from natural reproduction occurring in the surface waters. Additional biological information may be considered by the Department which evaluates the presence or absence of early life stages.

* * * * *

§ 93.8b. Metals criteria.

Dissolved criteria are footnoted in Table 5, and have been developed by applying the most current EPA conversion factors to the total recoverable criteria. The EPA factors are listed in the following Conversion Factors Table.

Conversion Factors Table

	Chronic	*Acute*	*Source*
Arsenic	1.000 (As3+)	1.000 (As3+)	1,2
Cadmium	1.101672- (ln[H] x 0.041838)	1.136672- (ln[H] x 0.041838)	2
Chromium III	**.860**	**.316**	**1,2**
Chromium VI	0.962	0.960	1, 2

* * * * *

§ 93.8c. Human health and aquatic life criteria for toxic substances.

* * * * *

TABLE 5

WATER QUALITY CRITERIA FOR TOXIC SUBSTANCES

			Fish and Aquatic Life Criteria		*Human*
PP NO	*Chemical Name*	*CAS Number*	*Criteria Continuous Concentrations (ug/L)*	*Criteria Maximum Concentration (ug/L)*	*Health Criteria (ug/L)*

			* * * * *			
9A	PENTACHLORO-PHENOL	00087865	Exp(1.005x[pH]-5.134) @pH= 6.5 7.8 9.0 Crit= 4.1 15 50	Exp(1.005x[pH]-4.869) @pH= 6.5 7.8 9.0 Crit= 5.3 19 65	0.27	CRL
10A	PHENOL	00108952	N/A	N/A	**[21000] 10400**	H
11A	2,4,6-TRICHLOROPHENOL	00088062	91	460	1.4	CRL
1V	ACROLEIN	00107028	**[1] 3.0**	**[5] 3.0**	**[190] 6.0**	H
2V	ACRYLONITRILE	00107131	130	650	0.051	CRL
			* * * * *			
26V	1,2 trans-DICHLORO-ETHYLENE	00156605	1400	6800	140	H
=	**1,2 cis-DICHLORO-ETHYLENE**	**00156592**	**N/A**	**N/A**	**12**	**H**
27V	1,1,1-TRICHLORO-ETHANE	00071556	610	3000	N/A	-
			* * * * *			
—	ACETONE	00067641	86000	450000	3500	H
=	**ACRYLAMIDE**	**00079061**	**N/A**	**N/A**	**0.07**	**CRL**
—	ALUMINUM	07429905	N/A	750	N/A	-
—	BARIUM	07440393	4100	21000	2400	H
=	**BENZENE METADISULFONIC ACID**	**00098486**	**1600000**	**2600000**	**N/A**	**-**
=	**BENZENE MONOSULFONIC ACID**	**00098113**	**1200000**	**2000000**	**N/A**	**-**
=	**BENZYL CHLORIDE**	**00100447**	**N/A**	**N/A**	**0.2**	**CRL**
—	BORON	07440428	1600	8100	3100	H
=	**2-BUTOXY ETHANOL**	**00111762**	**N/A**	**N/A**	**700**	**H**
—	COBALT	07440484	19	95	N/A	-
—	p-CRESOL	00106445	160	800	N/A	-
=	**CYCLOHEXYLAMINE**	**00108918**	**N/A**	**N/A**	**1000**	**H**
[—	~~**1,4-DIOXANE**~~	~~**00123911**~~	~~**N/A**~~	~~**N/A**~~	~~**0.35**~~	~~**CRL**~~]
—	DIAZINON	**00**333415	0.17	0.17	N/A	-
—	FORMALDEHYDE	00050000	440	2200	700	H

—	2-HEXANONE	00591786	4300	21000	N/A	-
—	LITHIUM	07439932	N/A	N/A	N/A	-
—	METHYLETHYL KETONE	00078933	32000	230000	21000	H
—	METHYLISO-BUTYL KETONE	00108101	5000	26000	N/A	-
—	METOLACHLOR	51218452	NA	NA	69	H
[—	~~MOLYBDENUM~~	~~7439987~~	~~1900~~	~~6000~~	~~210~~	~~H~~]
=	**NONYLPHENOL**	**00104405**	**6.6**	**28**	**N/A**	**-**
=	**P-PHENOL SULFONIC ACID**	**00098679**	**1400000**	**3500000**	**N/A**	**-**
—	I-PROPANOL	00071238	46000	230000	N/A	-
—	2-PROPANOL	00067630	89000	440000	N/A	-
=	**RESORCINOL**	**01084603**	**7200**	**28000**	**2700**	**H**
=	**STRONTIUM**	**07440246**	**N/A**	**N/A**	**4000**	**H**
—	1,2,3-TRICHLORO-PROPANE	00096184	N/A	N/A	210	H
=	**1,2,4-TRIMETHYLBENZENE**	**00095636**	**N/A**	**N/A**	**72**	**H**
=	**1,3,5-TRIMETHYLBENZENE**	**00108678**	**N/A**	**N/A**	**72**	**H**
—	VANADIUM	07440622	100	510	N/A	-
—	XYLENE	01330207	210	1100	70000	H

* * * * *

§ 93.8d. Development of site-specific water quality criteria.

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(f) If the Department determines that site-specific criteria are appropriate in accordance with subsection (a), the Department will do the following:

(1) Publish the site-specific criterion in the *Pennsylvania Bulletin*, along with other special conditions under **[§ 92.61(a)(5)]** **§§ 92a.82(b)(3) [~~and 92a.83~~]** (relating to public notice of permit application**S AND DRAFT PERMITS**[~~; and PUBLIC NOTICE OF public hearing~~]) and provide for public participation and public hearing in accordance with § **[92.61 and §§ 92.63 and 92.65]** **92a.81, 92a.82, 92a.83 and 92a.85** (relating to public access to information; **PUBLIC NOTICE OF PERMIT APPLICATIONS AND DRAFT PERMITS;PUBLIC NOTICE OF PUBLIC HEARING;** and notice to other government agencies).

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§ 93.9b. Drainage List B.

Delaware River Basin in Pennsylvania

Lackawaxen River

Stream	Zone	County	Water Uses Protected	Exceptions to Specific Criteria
1—Delaware River				
2—Lackawaxen River				
3—West Branch Lackawaxen River	Basin, Source to Prompton Reservoir	Wayne	HQ-CWF, MF	None
3—West Branch Lackawaxen River	Main Stem, Prompton Reservoir to Confluence with **[Dyberry Creek]** **Lackawaxen River and Van Auken Creek**	Wayne	HQ-TSF, MF	None
4—**[Unnamed]** Tributaries to West Branch Lackawaxen River	Basins, Prompton Reservoir to Confluence with **[Dyberry Creek]** **Lackawaxen River and Van Auken Creek**	Wayne	HQ-CWF, MF	None
[4] 3—Van Auken Creek	Basin	Wayne	HQ-TSF, MF	None
2—Lackawaxen River	**Mainstem, confluence of West Branch Lackawaxen River and Van Auken Creek to Dyberry Creek**	**Wayne**	**HQ-TSF, MF**	**None**
3—Tributaries to Lackawaxen River	**Basins, confluence of West Branch Lackawaxen River and Van Auken Creek to Dyberry Creek**	**Wayne**	**HQ-CWF, MF**	**None**
3—Dyberry Creek				
4—West Branch Dyberry Creek	Basin	Wayne	HQ-CWF, MF	None
4—East Branch Dyberry Creek	Basin	Wayne	EV, MF	None
3—Dyberry Creek	Basin, Confluence of West Branch Dyberry Creek and East Branch	Wayne	HQ-CWF, MF	None

	Dyberry Creek to Big Brook			
4—Big Brook	Basin	Wayne	EV, MF	None
3—Dyberry Creek	Basin, Big Brook to Mouth	Wayne	HQ-CWF, MF	None
2—Lackawaxen River	Main Stem, **[Confluence of West Branch Lackawaxen River and]** Dyberry Creek to Mouth	Wayne	HQ-TSF, MF	None
3—**[Unnamed]** Tributaries to Lackawaxen River	Basins, **[Confluence of West Branch Lackawaxen River and]** Dyberry Creek to **[Mouth]** **Wallenpaupack Creek**	Wayne	HQ-CWF, MF	None
[3—Carley Brook	**Basin**	**Wayne**	**HQ-CWF, MF**	**None**
3—Middle Creek	**Basin**	**Wayne**	**HQ-CWF, MF**	**None]**
3—Wallenpaupack Creek	Basin, Source to Lake Wallenpaupack Dam	Wayne-Pike	HQ-CWF, MF	None
3—Wallenpaupack Creek	Basin, Lake Wallenpaupack Dam to Mouth	Wayne-Pike	HQ-WWF, MF	None
3-Tributaries to Lackawaxen River	**Wallenpaupack Creek to Mouth**	**Pike**	**HQ-CWF, MF**	**None**
[3—Swamp Brook	**Basin**	**Pike**	**HQ-CWF, MF**	**None**
3—Tinkwig Creek	**Basin**	**Pike**	**HQ-CWF, MF**	**None**
3—Decker Creek	**Basin**	**Pike**	**HQ-CWF, MF**	**None**
3—Teedyuskung Creek	**Basin**	**Pike**	**HQ-CWF, MF**	**None**
3—Blooming Grove Creek	**Basin**	**Pike**	**HQ-CWF, MF**	**None**
3—Little Blooming Grove Creek	**Basin**	**Pike**	**HQ-CWF, MF**	**None**
3—Grassy Island Creek	**Basin**	**Pike**	**HQ-CWF, MF**	**None**
3—Kirkham Creek	**Basin**	**Pike**	**HQ-CWF, MF**	**None**
3—West Falls Creek	**Basin**	**Pike**	**HQ-CWF, MF**	**None**

3—Mill Creek	**Basin**	**Pike**	**HQ-CWF, MF**	**None**
3—O'Donnell Creek	**Basin**	**Pike**	**HQ-CWF, MF**	**None**
3—Lords Creek	**Basin**	**Pike**	**HQ-CWF, MF**	**None]**

§ 93.9c. Drainage List C.
Delaware River Basin in Pennsylvania
Delaware River

Stream	Zone	County	Water Uses Protected	Exceptions to Specific Criteria
	* * * * *			
3—Pine Mountain Run	Basin	Monroe	HQ-CWF, MF	None
3—Leas Run	**Basin**	**Monroe**	**HQ-CWF, MF**	**None**
3—Paradise Creek	**[Main Stem] Basin, source to Devils Hole Creek**	Monroe	HQ-CWF, MF	None
[4—Unnamed Tributaries to Paradise Creek	**Basins**	**Monroe**	**HQ-CWF, MF**	**None]**
4—Devils Hole Creek	Basin, Source to South Boundary of State Game Lands No. 221 (about 0.25 mile north of Erie-Lackawanna R. R.)	Monroe	EV, MF	None
4—Devils Hole Creek	Basin, South Boundary of State Game Lands No. 221 to Mouth	Monroe	HQ-CWF, MF	None
3—Paradise Creek	**Basin, Devils Hole Creek to Mouth**	**Monroe**	**HQ-CWF, MF**	**None**
[4—Yankee Run	**Basin**	**Monroe**	**HQ-CWF, MF**	**None**
4—Swiftwater Creek	**Basin**	**Monroe**	**HQ-CWF, MF**	**None**
4—Cranberry Creek	**Basin**	**Monroe**	**HQ-CWF, MF**	**None**
4—Butz Run	**Basin**	**Monroe**	**HQ-CWF, MF**	**None]**
3—Michael Creek	Basin	Monroe	HQ-CWF, MF	None

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3—McMichael Creek	Basin, T434 to Pocono Creek	Monroe	HQ-CWF, MF	None
4—Pocono Creek	**[Main Stem**	**Monroe**	**HQ-CWF, MF**	**None**
5—Unnamed Tributaries to Pocono Creek	**Basins**	**Monroe**	**HQ-CWF, MF**	**None]**
5—Dry Sawmill Run	Basin, **Source to Sand Spring Run**	Monroe	HQ-CWF, MF	None
[5]6—Sand Spring Run	Basin	Monroe	EV, MF	None
5—Dry Sawmill Run	**Basin, Sand Spring Run to confluence with Wolf Swamp Run**	**Monroe**	**HQ-CWF, MF**	**None**
5—Wolf Swamp Run	Basin, **Source to a Confluence Point (41°3'35.2" N; 75°22'2.4"W) approximately 185 meters upstream of the mouth**	Monroe	EV, MF	None
5—Wolf Swamp Run	**Basin, Point of Confluence (41°3'35.2" N; 75°22'2.4"W) Downstream to Confluence with Dry Sawmill Run**	**Monroe**	**HQ-CWF, MF**	**None**
4—Pocono Creek	**Basin, Confluence of Dry Sawmill Run and Wolf Swamp Run to Mouth**	**Monroe**	**HQ-CWF, MF**	**None**
[5—Scot Run	**Basin**	**Monroe**	**HQ-CWF, MF**	**None**
5—Bulgers Run	**Basin**	**Monroe**	**HQ-CWF, MF**	**None**
5—Cranberry Creek	**Basin**	**Monroe**	**HQ-CWF, MF**	**None**
5—Reeders Run	**Basin**	**Monroe**	**HQ-CWF, MF**	**None**
5—Wigwam Run	**Basin**	**Monroe**	**HQ-CWF, MF**	**None**
5—Flagler Run	**Basin**	**Monroe**	**HQ-CWF,**	**None**

5—Big Meadow Run	**Basin**	**Monroe**	**MF HQ-CWF, MF**	**None]**
3—**[McMichaels]** **McMichael** Creek	Basin, Pocono Creek to Mouth	Monroe	TSF, MF	None

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2—Slateford Creek	Basin, Source to T 735**[4]** Bridge	Northampton	EV, MF	None
2—Slateford Creek	Basin, T 735**[4]** Bridge to Mouth	Northampton	CWF, MF	None

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§ 93.9d. Drainage List D.

Delaware River Basin in Pennsylvania

Lehigh River

Stream	**Zone**	**County**	**Water Uses Protected**	**Exceptions to Specific Criteria**

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3—Saucon Creek	Main Stem, Black River to SR 412 Bridge	Northampton	HQ-CWF, MF	None
4—Unnamed Tributaries to Saucon Creek	Basins, Black **[Creek]** **River** to SR 412 Bridge	Northampton	CWF, MF	None
3—Saucon Creek	Basin, SR 412 Bridge to Mouth	Northampton	CWF, MF	None

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§ 93.9e. Drainage List E.

Delaware River Basin in Pennsylvania

Delaware River

Stream	**Zone**	**County**	**Water Uses Protected**	**Exceptions To Specific Criteria**

* * * * * *

3—Little Neshaminy Creek	Basin	Bucks	WWF, MF	*Add* Tur_1
3—Mill Creek	**[Basin, Source to Watson Creek**	**Bucks**	**CWF, MF**	***Add* Tur_2]**
4—Lahaska Creek	**Basin**	**Bucks**	**CWF, MF**	***Add* Tur_2**
4—Watson Creek	Basin	Bucks	CWF, MF	*Add* Tur_2
3—Mill Creek	Basin, **Confluence of Lahaska Creek and** Watson Creek to Mouth	Bucks	WWF, MF	*Add* Tur_1

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§ 93.9f. Drainage List F.

Delaware River Basin in Pennsylvania

Schuylkill River

Stream	Zone	County	Water Uses Protected	Exceptions to Specific Criteria
	* * * * *			
3—Little Schuylkill River	Basin, Rattling Run to Mouth	Schuylkill	CWF, MF	None
2—Schuylkill River	Main Stem, Little Schuylkill River to **[Head of Tide]** **Valley Creek**	**[Philadelphia]** **Montgomery-Chester**	WWF, MF	None
3—Unnamed Tributaries to Schuylkill River	Basins, Little Schuylkill River to Berks-Chester-Montgomery County Border	Schuylkill-Berks	WWF, MF	None
	* * * * *			
3—Monocacy Creek	Basin	Berks	WWF, MF	None
3—Leaf Creek	**Basin**	**Berks**	**WWF, MF**	**None**
3—UNT's Schuylkill River	Basins (all UNT's along Montgomery County shore), Berks-Chester- Montgomery County border to	Montgomery	WWF,MF	None

Valley Creek

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3—Pickering Creek	Basin, Philadelphia Suburban Water Company Dam to Mouth	Chester	WWF, MF	None
3—Crossmans Run	**Basin**	**Montgomery**	**WWF,MF**	**None**
3—Perkiomen Creek	Basin, Source to SR 1010 Bridge at Hereford	Berks	HQ-CWF, MF	None

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3—Valley Creek	Basin	Montgomery-Chester	EV, MF	None
[3—UNTs to Schuylkill River	**Basins, Valley Creek to UNT 00926 at RM 18.9**	**Chester-Montgomery**	**WWF, MF**	**None**
3—Trout Creek	**Basin**	**Montgomery**	**WWF, MF**	**None**
3—Indian Creek	**Basin**	**Montgomery**	**WWF, MF**	**None**
3—Crow Creek	**Basin**	**Montgomery**	**WWF, MF**	**None]**
2—Schuylkill River	**Basin, Valley Creek to Stony Creek**	**Montgomery**	**WWF, MF**	**None**
3—Stony Creek	Basin	Montgomery	TSF, MF	None
[3—Sawmill Run	**Basin**	**Montgomery**	**WWF, MF**	**None**
3—Diamond Run	**Basin**	**Montgomery**	**WWF, MF**	**None**
3—Gulph Creek	**Basin**	**Montgomery**	**WWF, MF**	**None**
3—Plymouth Creek	**Basin**	**Montgomery**	**WWF, MF**	**None**
3—Arrowmink Creek	**Basin**	**Montgomery**	**WWF, MF**	**None]**
2--Schuylkill River	**Basin, Stony Creek to UNT 00926**	**Montgomery**	**WWF, MF**	**None**
3—UNT 00926 at RM 18.9 (locally Spring Mill Run)	Basin	Montgomery	CWF, MF	None
[3—UNTs to Schuylkill River	**Basins, UNT 00926 downstream to Head of Tide**	**Montgomery-Philadelphia**	**WWF, MF**	**None**
3—Sawmill Run	**Basin**	**Montgomery**	**WWF, MF**	**None]**
2—Schuylkill River	**Basin, UNT 00926 downstream to Mill Creek**	**Montgomery-Philadelphia**	**WWF, MF**	**None**

3—Mill Creek	Basin	Montgomery	TSF, MF	None
[3—Gulley Run	**Basin**	**Montgomery**	**WWF, MF**	**None]**
2—Schuylkill River	**Basin, Mill Creek to Wissahickon Creek**	**Montgomery-Philadelphia**	**WWF, MF**	**None**
3—Wissahickon Creek	Basin	Philadelphia	TSF, MF	None
2—Schuylkill River	**Basin, Wissahickon Creek to Head of Tide**	**Philadelphia**	**WWF, MF**	**None**

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§ 93.9g. Drainage List G.

Delaware River Basin in Pennsylvania

Delaware River

Stream	**Zone**	**County**	**Water Uses Protected**	**Exceptions to Specific Criteria**

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3—White Clay Creek				
4—East Branch White Clay **[Branch]** **Creek**	Basin, Source to Northern Border of Avondale Borough	Chester	EV, MF	None
4—East Branch White Clay Creek	Basin, Northern Border of Avondale Borough to Confluence with Middle Branch	Chester	CWF, MF	None

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5—Unnamed Tributaries to West Branch Brandywine Creek	Basins, T 437 Bridge to Dam at Valley Station (except those in West Brandywine Township)	Chester	TSF, MF	None
5—**[Unnamed]** Tributaries to West Branch Brandywine Creek	Basins, **all portions** in West Brandywine Township	Chester	HQ-TSF, MF	None
5—Birch Run	Basin, Source to Hibernia Park Dam	Chester	HQ-CWF, MF	None

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§ 93.9h. Drainage List H.

Susquehanna River Basin in Pennsylvania

Tioga River

Stream	Zone	County	Water Uses Protected	Exceptions to Specific Criteria
	* * * * *			
2—Tioga River	Basin, Mill Creek to Crooked Creek	Tioga	CWF, MF	None
3—Crooked Creek	Basin, Source to **[Catlin Hollow]** **Norris Brook**	Tioga	WWF, MF	None
3—Crooked Creek	Main Stem, **[Catlin Hollow]** **Norris Brook** to Mouth	Tioga	WWF, MF	None
4—Unnamed Tributaries to Crooked Creek	Basins, **[Catlin Hollow]** **Norris Brook** to Mouth	Tioga	WWF, MF	None
4—**[Catlin Hollow]** **Norris Brook**	Basin	Tioga	TSF, MF	None
4—Sweet Hollow	Basin	Tioga	WWF, MF	None
	* * * * *			

§ 93.9i. Drainage List I.

Susquehanna River Basin in Pennsylvania

Susquehanna River

Stream	Zone	County	Water Uses Protected	Exceptions to Specific Criteria
	* * * * *			
3—Alba Creek	Basin	Bradford	CWF, MF	None
3—Beech Flats Creek	**Basin**	**Bradford**	**CWF, MF**	**None**
3—Wallace Brook	**Basin**	**Bradford**	**CWF, MF**	**None**
3—Gulf Brook	**Basin**	**Bradford**	**CWF, MF**	**None**
3—North Branch Towanda Creek	Basin	Bradford	CWF, MF	None

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3—Schrader Creek	Basin, Coal Run to Mouth	Bradford	HQ-CWF, MF	None
3—French Run	**Basin**	**Bradford**	**CWF, MF**	**None**
3—South Branch Towanda Creek	Basin	Bradford	CWF, MF	None

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§ 93.9k. Drainage List K.

Susquehanna River Basin in Pennsylvania

Susquehanna River

Stream	Zone	County	Water Uses Protected	Exceptions to Specific Criteria
1—Susquehanna River	Main Stem, Lackawanna River to West Branch Susquehanna River	Northumberland	WWF, MF	None
2—Unnamed Tributaries To Susquehanna River	Basins, Lackawanna River to [~~West Branch Susquehanna River~~]MAHONING CREEK	Luzerne-Columbia Montour Northumberland	CWF, MF	None
2—Abrahams Creek	Basin	Luzerne	CWF, MF	None

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2—Toby Run	Basin	Montour	CWF, MF	None
[2—Sechler Run	**Basin**	**Montour**	**CWF, MF**	**None]**
2—Mahoning Creek	Main Stem, Source to PA 54 Bridge	Montour	TSF, MF	None
3—Unnamed Tributaries to Mahoning Creek	Basins, Source to PA 54 Bridge	Montour	CWF, MF	None
3—Kase Run	Basin	Montour	CWF, MF	None
3—Mauses Creek	Basin	Montour	CWF, MF	None
2—Mahoning Creek	Main Stem, PA 54 Bridge to Mouth	Montour	WWF, MF	None

3—Unnamed Tributaries to Mahoning Creek	Basin, PA 54 Bridge to Mouth	Montour	CWF, MF	None
~~3—Sechler Run~~	~~Basin~~	~~Montour~~	~~CWF, MF~~	~~None~~
~~[2—Wilson Run~~	~~Basin~~	~~Northumberland~~	~~CWF, MF~~	~~None~~
~~2—Gravel Run~~	~~Basin~~	~~Northumberland~~	~~CWF, MF~~	~~None~~
~~2—Lithia Spring Creek~~	~~Basin~~	~~Northumberland~~	~~CWF, MF~~	~~None~~]
2—TRIBUTARIES TO SUSQUEHANNA RIVER	BASINS, MAHONING CREEK TO WEST BRANCH SUSQUEHANNA RIVER	MONTOUR-NORTHUMBERLAND	CWF, MF	NONE

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§ 93.9l. Drainage List L.

Susquehanna River Basin in Pennsylvania

West Branch Susquehanna River

Stream	Zone	County	Water Uses Protected	Exceptions to Specific Criteria
	* * * * *			
4—Commissioners Run	Basin	Clinton	HQ-CWF, MF	None
4—**[Grass Flats]** **Wistar** Run	Basin	Clinton	HQ-CWF, MF	None
4—Moccasin Run (Moccasin Falls Run)	Basin	Clinton	HQ-CWF, MF	None
	* * * * *			
4—Mill Creek	Basin	Tioga	HQ-CWF, MF	None
4—Roaring **[Brook]** **Branch**	Basin	Tioga	HQ-CWF, MF	None
4—Abbott Run	Basin	Lycoming	HQ-CWF, MF	None
	* * * * *			
5—Mock Creek	Basin	Lycoming	HQ-CWF, MF	None

[5—Wolf Run	**Basin, Source to Noon Branch**	**Lycoming**	**HQ-CWF, MF**	**None**
6—Noon Branch Wolf Run	**Basin**	**Lycoming**	**EV, MF**	**None**
5—Wolf Run	**Basin, Noon Branch to Mouth**	**Lycoming**	**HQ-CWF, MF**	**None]**
5—Noon Branch	**Basin, Source to Wolf Run**	**Lycoming**	**EV, MF**	**None**
6—Wolf Run	**Basin**	**Lycoming**	**HQ-CWF, MF**	**None**
5—Noon Branch	**Basin, Wolf Run to Mouth**	**Lycoming**	**HQ-CWF, MF**	**None**
5—King Run	Basin, Source to Engle Run	Lycoming	HQ-CWF, MF	None

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§ 93.9m. Drainage List M.

Susquehanna River Basin in Pennsylvania

Susquehanna River

Stream	Zone	County	Water Uses Protected	Exceptions to Specific Criteria
	* * * * *			
2—Penns Creek	Main Stem, Laurel Run to Mouth	Snyder	WWF, MF	None
[2—Penns Creek]				
3—Unnamed Tributaries to Penns Creek	Basins, Laurel Run to RM 26.50	Union	CWF, MF	None
	* * * * *			
3—Crab Run	Basin	Schuylkill	CWF, MF	None
3—Zerbe Run	Basin	**[Schuylkill]** **Northumberland**	CWF, MF	None
3—Schwaben Creek	Basin	Northumberland	TSF, MF	None

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§ 93.9n. Drainage List N.

Susquehanna River Basin in Pennsylvania

Juniata River

Stream	Zone	County	Water Uses Protected	Exceptions to Specific Criteria
	* * * * *			
5—Stone Creek	Basin, UNT 14908 to Mouth	Bedford	CWF, MF	None
5—Bobs Creek	Basin, Source to **[Deep Hollow]** **Pavia** Run	Bedford	HQ-CWF, MF	None
6—**[Deep Hollow]** **Pavia** Run	Basin	Bedford	HQ-CWF, MF	None
5—Bobs Creek	Basin, **[Deep Hollow]** **Pavia** Run to Mouth	Bedford	CWF, MF	None
5—Adams Run	Basin	Bedford	WWF, MF	None
	* * * * *			

§ 93.9o. Drainage List O.

Susquehanna River Basin in Pennsylvania

Susquehanna River

Stream	Zone	County	Water Uses Protected	Exceptions to Specific Criteria
	* * * * *			
3—Unnamed Tributaries to Conodoguinet Creek	Basins, PA 997 at Roxbury to Mouth	Franklin-Cumberland	WWF, MF	None
3—Muddy Run	Basin, **Source to Rowe Run**	Franklin	WWF, MF	None
[3—Keasey Run	**Basin**	**Franklin**	**WWF, MF**	**None]**
[3] **4**—Rowe Run	Basin	Franklin	CWF, MF	None
3—Muddy Run	**Basin, Rowe Run to Mouth**	**Franklin**	**WWF, MF**	**None**
3—Middle Spring Creek	Basin	Franklin-Cumberland	CWF, MF	None
	* * * * *			
3—Stoverstown Branch	Basin	York	WWF, MF	None

3—South Branch Codorus Creek	**[Main Stem] Basin, source to UNT from Glen Rock Valley at RM 16.85**	York	WWF, MF	None
[4—Unnamed Tributaries to South Branch Codorus Creek	**Basins, Source to Unnamed Tributary from Glen Rock Valley at RM 16.06**	**York**	**WWF, MF**	**None]**
4—**[Unnamed Tributary]** **UNT** to South Branch Codorus Creek Through Glen Rock Valley	Basin	York	CWF, MF	None
3—South Branch Codorus Creek	**Basin, UNT from Glen Rock Valley to East Branch Codorus Creek**	**York**	**WWF, MF**	**None**
[4—Unnamed Tributaries to South Branch Codorus Creek	**Basins, Unnamed Tributary from Glen Rock Valley to Mouth**	**York**	**WWF, MF**	**None**
4—Trout Run	**Basin**	**York**	**WWF, MF**	**None**
4—Foust Creek	**Basin**	**York**	**WWF, MF**	**None**
4—Centerville Creek	**Basin**	**York**	**WWF, MF**	**None**
4—Cherry Run	**Basin**	**York**	**WWF, MF**	**None**
4—Fishel Creek	**Basin**	**York**	**WWF, MF**	**None]**
4—East Branch Codorus Creek	Basin, Source to PA 214	York	HQ-CWF, MF	None
4—East Branch Codorus Creek	Basin, PA 214 to Inlet of Lake Redman	York	CWF, MF	None
4—East Branch Codorus Creek	Main Stem, Inlet of Lake Redman to Mouth	York	WWF, MF	None
5—**[Unnamed Tributaries]** **UNTs** to East Branch Codorus Creek	**Basins,** Inlet of Lake Redman to Mouth	York	CWF, MF	None
5—Inners Creek	Basin	York	CWF, MF	None
3—South Branch Codorus Creek	**Basin, East Branch Codorus Creek to Mouth**	**York**	**WWF, MF**	**None**
3—Willis Run	Basin	York	WWF, MF	None

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2—Pequea Creek	Main Stem, Source to PA 897	Lancaster	HQ-CWF, MF	None
3—Unnamed Tributaries to Pequea Creek	Basins, Source to PA 897	Lancaster	HQ-CWF, MF	None
3—Indian Spring Run	**Basin, Source to SR 10 Bridge**	**Chester**	**EV, MF**	**None**
3—Indian Spring Run	**Basin, SR10 BRIDGE to Confluence of UNT 07540 at RM 1.95**	**Lancaster**	**CWF, MF**	**None**
4—UNT 07540 at RM 1.95 to Indian Spring Run	**Basin, Source to SR10 Bridge**	**Chester**	**HQ-CWF, MF**	**None**
4—UNT 07540 at RM 1.95 to Indian Spring Run	**Basin, SR10 Bridge to Mouth**	**Lancaster**	**CWF, MF**	**None**
3—Indian Spring Run	**Basin, UNT 07540 AT RM 1.95 to Mouth**	**Lancaster**	**CWF, MF**	**None**
2—Pequea Creek	Main Stem, PA 897 to Mouth	Lancaster	WWF, MF	None
3—Unnamed Tributaries to Pequea Creek	Basins, PA 897 to Eshleman Run	Lancaster	CWF, MF	None
[3—Indian Spring Run	**Basin, Source to SR 10 Bridge**	**Chester**	**EV, MF**	**None**
3—Indian Spring Run	**Basin, SR10 to Confluence of UNT 07540 at RM 1.95**	**Lancaster**	**CWF, MF**	**None**
4—UNT 07540 at RM 1.95 to Indian Spring Run	**Basin, Source to SR10 Bridge**	**Chester**	**HQ-CWF, MF**	**None**
4—UNT 07540 at RM 1.95 to Indian Spring Run	**Basin, SR10 Bridge to Mouth**	**Lancaster**	**CWF, MF**	**None**
3—Indian Spring Run	**Basin, UNT 07540 to Mouth**	**Lancaster**	**CWF, MF**	**None]**
3—White Horse Run	Basin	Lancaster	WWF, MF	None

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2—Peters Creek	Basin	Lancaster	HQ-WWF, MF	None
2—Haines **[Run]** **Branch**	Basin	Lancaster	HQ-WWF, MF	None
2—Michael Run	Basin (all sections	York	WWF, MF	None

in PA)

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§ 93.9s. Drainage List S.

Ohio River Basin in Pennsylvania

Allegheny River

Stream	Zone	County	Water Uses Protected	Exceptions To Specific Criteria
	* * * * *			
5—Reisinger Run	Basin	Clearfield	CWF	None
5—**[Pent]** **Pentz** Run	Basin	Clearfield	CWF	None
5—Beaver Run	Basin	Clearfield	CWF	None
	* * * * *			
4—North Fork Redbank Creek	**[Main Stem]** **Basin**, Source to **[Confluence with Sandy Lick Creek]** **South Branch of North Fork Redbank Creek**	Jefferson	HQ-CWF	None
[5—Unnamed Tributaries to North Fork	**Basins, Source to Confluence with Sandy Lick Creek**	**Jefferson**	**HQ-CWF**	**None**
5—Williams Run	**Basin**	**Jefferson**	**HQ-CWF**	**None**
5—Muddy Run	**Basin**	**Jefferson**	**HQ-CWF**	**None**
5—Bearpen Run	**Basin**	**Jefferson**	**HQ-CWF**	**None**
5—Manners Run	**Basin**	**Jefferson**	**HQ-CWF**	**None**
5—Mammy Hi Run	**Basin**	**Jefferson**	**HQ-CWF**	**None**
5—Lucas Run	**Basin**	**Jefferson**	**HQ-CWF**	**None]**
5—South Branch of North Fork Redbank Creek	Basin	Jefferson	EV	None
4—North Fork Redbank Creek	**Basin, South Branch of North Fork Redbank Creek to Shippen**	**Jefferson**	**HQ-CWF**	**None**

	Run			
[5—Acy Run	**Basin**	**Jefferson**	**HQ-CWF**	**None**
5—Windfall Run	**Basin**	**Jefferson**	**HQ-CWF**	**None**
5—Clear Run	**Basin**	**Jefferson**	**HQ-CWF**	**None**
5—Miller Run	**Basin**	**Jefferson**	**HQ-CWF**	**None]**
5—Shippen Run	Basin	Jefferson	EV	None
4—North Fork Redbank Creek	**Basin, Shippen Run to Craft Run**	**Jefferson**	**HQ-CWF**	**None**
5—Craft Run	Basin	Jefferson	EV	None
4—North Fork Redbank Creek	**Basin, Craft Run to Mouth**	**Jefferson**	**HQ-CWF**	**None**
[5—Pekin Run	**Basin**	**Jefferson**	**HQ-CWF**	**None**
5—Red Lick Run	**Basin**	**Jefferson**	**HQ-CWF**	**None**
5—Sugarcamp Run	**Basin**	**Jefferson**	**HQ-CWF**	**None]**

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§ 93.9w. Drainage List W.

Ohio River Basin in Pennsylvania

Ohio River

Stream	Zone	County	Water Uses Protected	Exceptions to Specific Criteria
	* * * * *			
3—Enlow Fork	Main Stem, Source to PA-WV State Border	Washington-Greene	TSF	None
4—**[Unnamed]** Tributaries to Enlow Fork	Basins, Source to **[PA-WV State Border]** **Templeton Fork**	Washington-Greene	WWF	None
[4—Boothe Run	**Basin**	**Greene**	**WWF**	**None**
4—Long Run	**Basin**	**Washington**	**WWF**	**None]**
4—Templeton Fork	Basin	Washington	TSF	None
4—Tributaries to Enlow Fork	**Basins, Templeton Fork to PA-WV State Border (all sections in PA)**	**Washington-Greene**	**WWF**	**None**

[4—Owens Run	**Basin**	**Greene**	**WWF**	**None**
4—Robinson Fork	**Basin**	**Washington**	**WWF**	**None**
4—Spottedtail Run	**Basin (all sections in PA)**	**Washington**	**WWF**	**None]**
3—Enlow Fork (WV)				

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§ 93.9z. Drainage List Z.

Potomac River Basin in Pennsylvania

Potomac River

Stream	Zone	County	Water Uses Protected	Exceptions to Specific Criteria
	* * * * *			
2—Antietam Creek (MD)				
3—Unnamed tributaries to Antietam Creek	Basins (all sections in PA), PA-MD State Border to Mouth	Franklin	WWF, MF	None
3—Marsh Run	Basin (all sections in PA)	Franklin	WWF, MF	None
2—Monocacy River (MD)				
3—Marsh Creek	Basin, Source to Willoughby Run	Adams	CWF, MF	None
4—Willoughby Run	Basin	Adams	WWF, MF	None
3—Marsh Creek	Basin, Willoughby Run to PA-MD State Border	Adams	CWF, MF	None
3—Marsh Creek MD				
4—Unnamed tributaries to Marsh Creek	Basins (all sections in PA) PA-MD State Border to **[Mouth] confluence with Marsh Creek and Monocacy River**	Adams	CWF, MF	None
3—Rock Creek	Basin (all sections in PA),	Adams	WWF, MF	None

	source to confluence with Marsh Creek and Monocacy River			
3—Alloway Creek	Basin (all sections in PA)	Adams	WWF, MF	None
3—Cattail Branch	Basin (all sections in PA)	Adams	WWF, MF	None

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COMMENTATOR LIST

Triennial Review of Water Quality Standards – TR13

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19	Mr.	Robert		Bottegal	Manager of Technical Services	AMFIRE Mining Company, LLC	rbottegal@alphanr.com	Latrobe	PA	15650		
20	Mr.	Samuel		Denisco	Vice President, Government Affairs	PA Chamber of Business and Industry		Harrisburg	PA	17101		
21	Mr.	Douglas		Biden	President	Electric Power Generation Association	doug@epga.org	Harrisburg	PA	17102	X	
22	Mr.	Larry		Merrill	Associate Director	EPA Region III Office of Standards, Assessment & TMDLs	Hakowski.Denise@epamail.epa.gov	Philadelphia	PA	19103		
23	Mr.	R. Timothy		Weston		International Molybdenum Association	tim.weston@klgates.com	Harrisburg	PA	17101	X	

24	Rep.	Martin	Causer	State Representative, 67th Legislative District	PA House of Representatives		Harrisburg	PA	17120	
25	Ms.	Emily	Collins	Clinical Assistant Professor	Clean Water Action	eac50@pitt.edu	Pittsburgh	PA	15213	X
26	Mr.	Burt	Waite	P.G.			Cochranton	PA	16314	
27	Ms.	Linda	Allen	Co-owner	Eagle Line Corporation		Pleasantville	PA	16341	
28	Mr.	William	Henderson	President	Titusville Oil & Gas Assoc		Pleasantville	PA	16341	
29	Ms.	Helen	Karns							
30	Mr.	Roger	Henderson				Pleasantville	PA	16341	
31	Mr.	Barry	Watson				Pleasantville	PA	16341	
32	Ms.	Renee	Rottman				Petrolia	PA	16050	
33	Mr.	Mark	Ames		A.A. Ames & Co, Inc.		Pleasantville	PA	16341	
34	Ms.	Robin	Ames							
35	Mr.	Ryan	Ames							
36	Mr.	Jake	Canter				Titusville	PA	16354	
37	Ms.	Melissa	Winans				Titusville	PA	16354	
38	Ms.	Tammy	Nunemaker				Pleasantville	PA	16341	
39	Mr.	Donald	Vanderhoof				Pleasantville	PA	16341	
40		Kessley	Winans				Titusville	PA	16354	
41	Ms.	Jen	Oaks				Titusville	PA	16354	
42	Mr.	Eric	Moore				Titusville	PA	16354	
43	Ms.	Dessa	Moore				Titusville	PA	16354	
44	Mr.	Keith	Oney				Pleasantville	PA	16341	
45	Ms.	Karen	Oney				Pleasantville	PA	16341	
46	Mr.	Brian	Oney				Pleasantville	PA	16341	
47	Mr.	Skip	Cook		Cook's Machine Work		Pleasantville	PA	16341	
48	Mr.	Charles	August				Pleasantville	PA	16341	
49	Mr.	Travis	Titus				Titusville	PA	16354	
50	Mr.	Kenneth	Anderson				Tionesta	PA	16353	
51	Mr.	David	Nelson	President	Nelson Energy Programs, Inc.		Lake Stevens	WA	98258	
52	Ms.	Marilyn	Henderson				Pleasantville	PA	16341	
53	Ms.	Aldene	Henderson				Pleasantville	PA	16341	
54	Mr.	Jay	Donovan				Titusville	PA	16354	
55	Mr.	Robert	Caldwell				Pleasantville	PA	16341	
56	Mr.	Tyler	Muir							
57	Mr.	Kyle	Muir							
58	Ms.	Barbara	McCormick							

59	Mr.	Frank	Dunkle				
60	Mr.	Dennis	Jack				
61	Mr.	Apollo	Shreffler				
62	Mr.	Marc	Chenicy				
63	Mr.	Ray	Miller				
64	Mr.	Eric	Kinnear				
65	Mr.	John	Haun				
66	Mr.	Craig	Horn				
67	Mr.	Jerrid	Schwab				
68	Mr.	William	Hochstetler				
69	Mr.	Mike	K.				
70	Mr.	David	Zimmermarc				
71	Mr.	Carl	Williams				
72	Mr.	Mike	Z.				
73		illegible					
74	Mr.	Roy	Pittman				
75	Mr.	Eric	Campbell II				
76	Mr.	Tom	S.				
77		illegible					
78	Mr.	Nick	W.				
79	Mr.	Wayne	Gilson				
80	Mr.	Ronald	Beck				
81	Mr.	Thomas	G.				
82	Mr.	Harvey	Long				
83		illegible			Pleasantville	PA	16341
84	Mr.	James	Lee				
85	Mr.	John	Bush				
86	Mr.	William	A.				
87	Mr.	Lawrence	W.				
88	Mr.	Robert	Stewart				
89	Mr.	Jay	Gill				
90	Mr.	Mark	Seeley				
91	Mr.	C Grant	George				
92	Ms.	Pam	Ames		Pleasantville	PA	16341
93	Mr.	Carl	Ames		Pleasantville	PA	16341
94	Ms.	Linda	S.	Allegheny Well Service Inc.	Franklin	PA	16323

95	Mr.	Richard	Perry		Oil City	PA	16301
96	Mr.	Jerome	M.	Fawnwood Energy, Inc.	Bruin	PA	16022
97	Mr.	Matthew	Boswak		New Castle	PA	16105
98	Mrs.	Kay	Kehm		Georgetown	PA	15043
99		illegible					
100	Mr.	Karl	Rottman, Jr.		Petrolia	PA	16050
101	Mrs.	Cathy	Covington				
102	Mr.	Nick	Mailloux				
103	Mrs.	Eleanor	Boswak				
104	Mr.	Ray	Webb		Embenton	PA	16373
105	Mr.	Melvin Carolyn	Kapp		Shippenville	PA	16254
106	Ms.	Ann	Rottman		Petrolia	PA	16050
107	Mr.	Donald	Taylor, Jr.		Franklin	PA	16323
108	Mr.	Scott	Taylor		Franklin	PA	16323
109	Ms.	Judith	M.		Fenelton	PA	16034
110	Mr.	Robert	Wyant				
111	Mr.	Dale	Flocking		Oil City	PA	16301
112	Mr.	Eric	W.		Oil City	PA	16301
113	Mr.	Adam	Hutchinson		Oil City	PA	16301
114		illegible			Oil City	PA	16301
115	Mr.	Kevin	L.		Seneca	PA	16346
116	Mr.	Robert	DeShong II		Oil City	PA	16301
117		B.	DeShong		Seneca	PA	16346
118	Mr.	Michael	W.		Oil City	PA	16301
119	Mr.	Ronald	Stroup		Oil City	PA	16301
120	Mr.	Russell	J.		Oil City	PA	16301
121	Ms.	Kelly	Mitchell		Oil City	PA	16301
122	Mr.	Michael	Baker		Oil City	PA	16301
123	Mr.	Joe	Stiglitz	Allegheny Well Service			
124	Mr.	Randall	Baker				
125	Mr.	John	Crawford				
126	Mr.	Eric	Milner				
127		Kris	Hulsizer				
128		Jamie	Baker				
129	Mr.	Justin	Baker				
130	Mr.	Robert	L.				

131	Mr.	Lloyd	Shrum
132	Mr.	Richard	Repasky
133	Ms.	Katelyn	Garrett
134	Ms.	Lisa	Repasky
135	Mr.	Joe	Porcenaluk
136	Mr.	James	Rumbaugh
137	Ms.	Nancy	Hunt
138	Ms.	Holly	Porcenaluk
139	Mr.	Gerald	Deeter
140	Mr.	John	Smith
141	Mr.	Renny	Richards
142	Ms.	Billie Jo	Rodgers
143	Mr.	David	Rodgers
144	Mr.	Rod	Brady
145	Ms.	Lynn	McGarvie
146		Donny	McGarvie
147	Mr.	David	Turner
148	Ms.	Penny	Turner
149	Mr.	Larry	Dodge
150	Ms.	Dale	B.
151	Ms.	Darlene	Britt
152	Mr.	Ryan	Talley
153	Ms.	Mykahla	Talley
154	Ms.	Erica	Snyder
155	Ms.	Kathleen	Snyder
156	Mr.	Jay	Worster
157	Mr.	James	Moyer
158	Mr.	Scott	Moyer
159	Ms.	Teresa	Dunnavant
160		illegible	
161	Mr.	Dewey	Scouter
162	Mr.	Scott	Horn
163	Mr.	James	Deeter
164	Mr.	Jeffery	Horn
165	Ms.	Bobbie Jo	Horn
166	Ms.	Christina	Donaldson

167		Jamie	W.							
168	Ms.	Sharon	Horn							
169	Mr.	Nathan	Horn							
170		illegible								
171		illegible								
172	Mr.	Paul	Savitz							
173	Mr.	Russell	Busd, Jr.							
174		illegible								
175		illegible								
176		illegible								
177		illegible								
178	Mr.	Keith	DeRose							
179	Mr.	James	Ruth							
180	Mr.	David	Renninger							
181	Mr.	Jerrid	Cook							
182	Mr.	Chris	Cook							
183	Ms.	Paige	Swanson							
184	Mr.	Colten	Oswalt							
185	Ms.	Karen	Schottenheimer							
186	Ms.	Amelia	Plyler							
187	Mr.	Thomas	Wencil, Jr.							
188	Ms.	Karen	Sobina							
189	Mr.	Stephen	MacQuarrie							
190	Mr.	Timothy	Sobina							
191	Ms.	Laurel Ann	Plyler							
192	Mr.	Glenn	Weaver							
193	Mr.	Robert	H.							
194		illegible								
195		illegible								
196	Mr.	Robert	Brace	President	BCD Properties, Inc.			Waterford	PA	16441
197	Mr.	David	Sumner	Executive Director	IRRC	irrc@irrc.state.pa.us		Harrisburg	PA	17101

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:
>
> ***
>
> (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, <u>where applicable</u>, when adopting rules and regulations. As described, these factors are <u>not applicable</u> 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 (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

<u>General and Supportive Dissolved Oxygen Comments</u>

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 (i.e. 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 (Na^{2+}) was the dominant cation associated with the sulfate (SO_4^{2-}) anion under the test conditions. In Pennsylvania streams natural Sodium (Na^{2+}) concentrations are low while calcium (Ca^{2+}) and Magnesium (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 it 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 2^0 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 steams 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

<u>Specific Aquatic Life Comments for Acrolein</u>

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

Response: Thank you for your supportive comment.

<u>Specific Aquatic Life Comments for the Sulfonic Acids</u>

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

<u>Specific Aquatic Life Comments for Molybdenum</u>

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 MoO_4. In aquatic environments the molybdate ion is the most abundant form when the in-stream pH is >5, and MoO_2^+ and 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 MoO_2^+ and 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 MoO_2^+ and 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 not 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 (IMOA): *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 Schamphelaere, 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 (IMOA): *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 Schamphelaere, 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.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
POLICY OFFICE

May 2, 2013

David Sumner
Executive Director
Independent Regulatory Review Commission
14th Floor
333 Market Street
Harrisburg, PA 17120

Re: Final Rulemaking: Triennial Review of Water Quality Standards (#7-475)

Dear Mr. Sumner:

Pursuant to Section 5.1(a) of the Regulatory Review Act, please find enclosed the Triennial Review of Water Quality Standards final-form rulemaking for review and comment by the Independent Regulatory Review Commission (IRRC). The Environmental Quality Board (EQB) adopted the final rulemaking at its April 16, 2013, meeting.

Section 303(c)(1) of the federal Clean Water Act requires that states periodically, but at least once every three years, review and revise as necessary their water quality standards. The enclosed final rulemaking fulfills Pennsylvania's triennial review obligation. Pennsylvania's water quality standards, which are codified in Chapter 93 and portions of Chapter 92a, are designed to implement the requirements of Sections 5 and 402 of The Clean Streams Law and Section 303 of the Federal Clean Water (33 U.S.C.A. § 1313). The water quality standards consist of the designated uses of the surface waters of this Commonwealth, along with the specific numerical and narrative criteria necessary to achieve and maintain those uses and an antidegradation policy. Thus, water quality standards are in-stream water quality goals that are implemented by imposing specific regulatory requirements, such as treatment requirements and effluent limitations, on individual sources of pollution.

The EQB adopted the proposed rulemaking on April 17, 2012, and the proposal was published in the *Pennsylvania Bulletin* at 42 *Pa.B.* 4367 on July 7, 2012, with notice of a 45-day public comment period and one public hearing in Harrisburg on August 8, 2012. Comments were received from 197 commentators. The majority of commentators expressed opposition to the proposed water quality criteria for molybdenum, sulfates and chlorides, and questioned whether the statewide criteria for these contaminants would impact the Commonwealth's economy and regulated community. Commentators also questioned the scientific studies the Department of Environmental Protection (Department) relied upon in the development of the criteria and requested that the Department perform additional instream monitoring and provide further justification on the need for the proposed statewide criteria for molybdenum, sulfates and chlorides.

Following the close of the public comment period on the proposed rulemaking, the Department, in coordination with its Water Resources Advisory Committee, convened an Ad Hoc Workgroup to discuss the proposed sulfate aquatic life criterion and the proposed aquatic life and human health criterion for molybdenum. As a result of discussions with the Ad Hoc Workgroup, the Department recommended and the EQB concurred to withdraw the proposed equation-based aquatic life criterion for sulfate from the final rulemaking as well as remove the proposed criterion for molybdenum. In response to recent and on-going research examining the relationship between various ion matrices and toxicity, the Department also recommended and the EQB concurred to withdraw the proposed equation-based (both the acute and chronic equations) aquatic life criterion for chloride from the final rulemaking. In addition, based on comments received, the Department recommended and the EQB concurred to remove the proposed statewide criterion for 1,4-dioxane, but retain the criterion as a site-specific criterion (3 µg/L) in 25 *Pa Code* Chapter 16. The EQB also adopted the Department's recommendation to remove the proposed language in 25 *Pa Code* §93.7 concerning the rate of temperature change.

The final rulemaking also includes other notable provisions that were recommended by the Department and adopted by the EQB. These provisions include amendments to 25 *Pa Code* Chapter 93 that will improve the public notification process associated with stream redesignation rulemaking activities, as included in § 93.4c; updates to the water quality criteria in § 93.7, Table 3 and §93.8, Table 5; updates to the language in § 93.8d in order to make it consistent with the language in Chapter 92a; and changes to correct drainage lists and typographic and grammatical errors.

In addition to the meetings of the Ad Hoc Workgroup identified above, the draft final regulations were discussed with WRAC at its November 28, 2012, meeting. WRAC approved moving forward with the final rulemaking, including presenting the final rulemaking for consideration by the EQB.

The Department will provide assistance as necessary to facilitate IRRC's review of the enclosed final-form rulemaking under Section 5.1(e) of the Regulatory Review Act.

Please contact me at 717.783.8727 or by e-mail at mtate@pa.gov if you have any questions or need additional information.

Sincerely,

Michele L. Tate

Michele L. Tate
Regulatory Coordinator

Enclosures

0120-FM-PY0011 8/2006

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF POLICY

TRANSMITTAL SHEET FOR REGULATIONS SUBJECT TO THE REGULATORY REVIEW ACT

I.D. NUMBER: 7- 475

SUBJECT: Triennial Review of Water Quality Standards

AGENCY: DEPARTMENT OF ENVIRONMENTAL PROTECTION

TYPE OF REGULATION

- ☐ Proposed Regulation
- ☒ Final Regulation
- ☐ Final Regulation with Notice of Proposed Rulemaking Omitted
- ☐ 120-day Emergency Certification of the Attorney General
- ☐ 120-day Emergency Certification of the Governor
- ☐ Delivery of Tolled Regulation
  a. ☐ With Revisions b. ☐ Without Revisions

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IRRC
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FILING OF REGULATION

DATE	SIGNATURE	DESIGNATION
5/2/13	Mary Seiger	Majority Chair, HOUSE COMMITTEE ON ENVIRONMENTAL RESOURCES & ENERGY Rep Ron Miller
5/2/13		Minority Chair, HOUSE COMMITTEE ON ENVIRONMENTAL RESOURCES & ENERGY
5/2/13		Majority Chair, SENATE COMMITTEE ON ENVIRONMENTAL RESOURCES & ENERGY Senator Gene Yaw
5/2/13		Minority Chair, SENATE COMMITTEE ON ENVIRONMENTAL RESOURCES & ENERGY
5/2/13		INDEPENDENT REGULATORY REVIEW COMMISSION
		ATTORNEY GENERAL (for Final Omitted only)
		LEGISLATIVE REFERENCE BUREAU (for Proposed only)