

**NOTICE OF PROPOSED RULEMAKING  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
ENVIRONMENTAL QUALITY BOARD**

**[25 Pa. Code Chapter 93]**

**Ambient Water Quality Criterion  
Chloride (Ch)**

**Preamble**

The Environmental Quality Board (Board) proposes to amend Table 3 at 25 Pa. Code § 93.7 to read as set forth in Annex A.

This proposal was adopted by the Board at its meeting of \_\_\_\_\_.

**A. Effective Date**

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

**B. Contact Persons**

For further information, contact Richard H. Shertzer, Chief, Division of Water Quality Standards, Bureau of Water Standards and Facility Regulation, Rachel Carson State Office Building, P.O. Box 8467, Harrisburg, PA 17105-8467, (717) 787-9637 or Michelle Moses, Assistant Counsel, Bureau of Regulatory Counsel, 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) web site at [www.depweb.state.pa.us](http://www.depweb.state.pa.us).

**C. Statutory and Regulatory Authority**

This proposed rulemaking is being 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 authorize the Board to develop and adopt rules and regulations to implement the 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. § 1313) sets forth requirements for water quality standards and the federal regulation at 40 CFR 131.32 (relating to Pennsylvania) sets forth certain requirements for portions of this Commonwealth's antidegradation program.

#### **D. Background of the Proposed Amendments**

Section 303(c)(1) of the Clean Water Act (33 U.S.C.A § 1313(c)(1)) requires that states periodically, but at least once every three years, review and revise as necessary their water quality standards. Water quality standards are instream water quality goals that are implemented by imposing specific regulatory requirements (such as treatment requirements and effluent limits) on individual sources of pollution. As part of the current review, the chloride criterion is being evaluated.

A state-wide aquatic life criterion for chloride would provide an appropriate level of protection for all of Pennsylvania's waters and would circumvent the difficulties associated with the implementation of the current osmotic pressure (OP) criterion. The existing chloride criterion was developed primarily for the protection of potable water supplies (PWSs). Although this criterion may be protective of instream aquatic life uses when applied, it is not applied in all waters of this Commonwealth, but rather only at the point of water supply intake, pursuant to 25 Pa. Code § 96.3(d) (relating to water quality protection requirements). Elevated levels of chloride are toxic to aquatic life in freshwater environments. Therefore, the Department is recommending additional chloride criteria to be applied in all waters for the protection of aquatic life. The current PWS criterion for chloride is included in Table 3 at 25 Pa. Code § 93.7 (relating to specific water quality criteria) and establishes a maximum level of 250 milligrams of chloride per liter of water, applicable only at the point of all existing or planned surface PWS withdrawals, unless otherwise specified by regulation.

Prior to December 14, 2002, the chloride criterion was applicable statewide, rather than only at the point of withdrawal. The movement of the compliance point for total dissolved solids (TDS), chloride and sulfate criteria to the point of water supply intake was not expected to be detrimental to aquatic life because the statewide surface water criterion for OP (OP = 50 mOsm/kg) was applied to protect aquatic life from the adverse effects of these other parameters throughout the waterbody. Unfortunately, there have been problems with the implementation of the OP criterion. Most notably, OP is a measure of pressure and, as such, it is not well suited to the mass-balance approach used to calculate Water Quality-Based Effluent Limitation (WQBELs). Additionally, OP can only be evaluated at a single discharge point, which does not account for the cumulative loads of dissolved constituents added to a stream from multiple sources. Finally, limited available laboratory capabilities for analysis of OP adversely affect compliance monitoring.

Chloride occurs naturally in the aquatic environment, especially in waters flowing through geologic formations of marine origin. The major anthropogenic sources of chloride include deicing salt for roads, urban and agricultural runoff, treated industrial waste, discharges from municipal wastewater plants and the drilling of oil and gas wells (EPA, 1988).

Freshwater fish and aquatic communities cannot survive in elevated concentrations of chlorides. Maintaining a proper salt-to-water balance in a fresh water environment challenges most aquatic life and, in particular, aquatic insects. Macroinvertebrates maintain an internal ionic concentration that is higher than the surrounding environment by actively transporting ions in and out of their bodies through osmoregulation according to Buchwalter and Luoma in a 2005

publication titled *Differences in dissolved cadmium and zinc uptake among stream insects: mechanistic explanations* (Environmental Science and Technology, 39:498-504). Osmoregulation can be disrupted by large increases in certain ions (including chloride). This disruption in water balance and ion exchange is capable of causing stress or death to the organism according to Pond, et al. in a 2008 publication titled *Downstream effects of mountaintop coal mining: comparing biological conditions using family- and genus-level macroinvertebrate bioassessment tools* (North American Benthological Society, 27:717-737).

The U.S. Environmental Protection Agency (EPA) published *Ambient Water Quality Criteria for Chloride* in February 1988, which summarized the published toxicity data for chlorides on freshwater plant and animal species. The acute and chronic effects of chlorides on aquatic animals were documented, along with the chronic effects of chloride on aquatic plants. EPA developed the chloride criteria given below for protection against adverse acute and chronic impacts on freshwater aquatic life based on the *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, PB85-227049 (Stephan, et al., 1985). EPA determined the four-day and one-hour chronic and acute average concentrations based upon how quickly some aquatic species reacted to higher concentrations of chlorides. The Criteria Continuous Concentration (CCC) and Criteria Maximum Concentration (CMC) values should not be exceeded more than once every three years on the average (EPA, 1988).

**The 4-day average (CCC) criterion = 230 mg/l**

**The 1-hour average (CMC) criterion = 860 mg/l**

A copy of the Department's rationale document on the development of the statewide water quality criterion for chloride is available on the Department's web site or from the contacts whose addresses and telephone numbers are listed in Section B. A link to *Ambient Water Quality Criteria for Chloride* (EPA, 1988) can also be found on the Department's web site.

The Department has reviewed the EPA ambient water quality criteria development document for chloride and agrees with the data analysis, interpretation and methods used to develop the criteria. The Department recommends adopting these national chloride criteria for protection of aquatic life due to increasing concerns about the statewide impact of natural gas extraction from the Marcellus Shale formation.

## **E. Benefits, Costs and Compliance**

**1. Benefits**—Overall, this 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 provides economic value to present and future generations in the form of clean water for drinking, recreational opportunities and aquatic life protection. It is important to realize these benefits to ensure economic opportunity and development continue in a manner that is environmentally and socially sound. Maintenance of water quality ensures its future availability for all uses.

**2. Compliance Costs**–The proposed 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 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 or there are changes in designated and existing uses of the stream. These increased costs may take the form of higher engineering, construction or operating cost for wastewater treatment facilities. Treatment costs are site-specific and depend upon the size of the discharge in relation to the size of the stream and many other factors.

Although not required, as part of the development of the criterion, the Department has reviewed available treatment technologies and had found that several processes are available to industry for the remediation of high dissolved chloride levels including evaporation, crystallization and reverse osmosis. Capital costs are dependent on the nature of the waste stream and other site-specific variables, making these costs difficult to estimate. However, operating costs for chloride removal can be generally estimated as follows:

Evaporation or crystallization facilities (for use with brines in excess of 40,000 mg/L TDS) will range from 25 - 50 cents per gallon. A facility should operate at the low end of the estimated range if it is designed to: 1) use natural gas at the wellhead as the energy source and 2) produce useable road salt as a byproduct.

Reverse Osmosis facilities (for use with low strength brines <40,000 mg/L) should produce satisfactory effluents at a cost of less than 1 cent per gallon.

While it is not possible to precisely predict the actual change in costs, it should be noted that the initial costs from technologically-improved treatments may be offset over time by potential savings from and increased value of better water quality through these improved and possibly more effective or efficient treatments.

**3. Compliance Assistance Plan**–The proposed revision has been developed as part of an established program that has been implemented by the Department since the early 1980s. The revision is consistent with and based on existing Department regulations.

The proposed amendment will be implemented, in part, through the National Pollutant Discharge Elimination System (NPDES) permitting program. Staff is available to assist regulated entities in complying with the regulatory requirement if questions arise.

**4. Paperwork Requirements**—The regulatory revisions should have no direct paperwork impact on this Commonwealth, local governments and political subdivisions or the private sector.

#### **F. Pollution Prevention**

Water quality standards are a major pollution prevention tool because they protect water quality and designated and existing uses. The proposed amendment will be implemented through the Department's permit and approval actions. For example, the NPDES bases effluent limitations on the applicable criteria and protected uses of the stream.

#### **G. Sunset Review**

The proposed amendments will be reviewed in accordance with the sunset review schedule published by the Department to determine whether the regulations effectively fulfill the goals for which they were intended.

#### **H. Regulatory Review**

Under section 5(a) of the Regulatory Review Act (71 P.S. § 745.5(a)), on \_\_\_\_\_, the Department submitted a copy of these proposed amendments to the Independent Regulatory Review Commission (IRRC) and the Chairpersons of the House and Senate Environmental Resources and Energy Committees (Committees). In addition to submitting the proposed amendments, the Department has provided IRRC and the Committees with a copy of a detailed regulatory analysis form prepared by the Department. A copy of this material is available to the public upon request.

Under section 5(g) of the Regulatory Review Act, IRRC may convey any comments, recommendations or objections to the proposed regulations within 30 days of the close of the public comment period. The comments, recommendations or objections shall specify the regulatory review criteria that have not been met. The Regulatory Review Act specifies detailed procedures for review of these issues by the Department, the General Assembly and the Governor prior to final publication of the regulations.

#### **I. Public Comments**

*Written Comments*—Interested persons are invited to submit comments, suggestions or objections regarding the proposed amendments to the Environmental Quality Board, P.O. Box 8477, Harrisburg, PA 17105-8477 (express mail: Rachel Carson State Office Building, 16th Floor, 400 Market Street, Harrisburg, PA 17101-2301). Comments submitted by facsimile will not be accepted. Comments must be received by the Board by \_\_\_\_\_ (within 45 days of publication in the *Pennsylvania Bulletin*). Interested persons may also submit a summary of their comments to the Board. The summary may not exceed one page in length and must also be received by \_\_\_\_\_. The one-page summary will be provided to each member of the Board in the agenda packet distributed prior to the meeting at which the proposed

amendments will be considered. If sufficient interest is generated as a result of this publication, a public hearing will be scheduled at an appropriate location to receive additional comments.

*Electronic Comments*—Comments may be submitted electronically to the Board at RegComments@state.pa.us. A subject heading of the proposal and return name and address must be included in each transmission. Comments submitted electronically must also be received by the Board by \_\_\_\_\_.

JOHN HANGER,  
Chairperson