Regulatory Analysis Form

(Completed by Promulgating Agency)

IRRC

Independent Regulatory Review Commission

SECTION I: PROFILE

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INDEPENDENT REGULATORY REVIEW COMMISSION

(1) Agency:
Department of Environmental Protection

(2) Agency Number:

Identification Number: 7-457

IRRC Number: 2841

(3) Short Title:
Ambient Water Quality Criterion - Chloride

(4) PA Code Cite:
25 Pa. Code, Chapter 93, Section 93.7

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

Primary Contact: Michele Tate 717-783-8727, RCSOB, 400 Market Street, Harrisburg, PA 17105, mtate@state.pa.us

Secondary Contact: Duke Adams, 717-783-8727, RCSOB, 400 Market Street, Harrisburg, PA 17105, ranadams@state.pa.us

(6) Primary Contact for Public Comments (List Telephone Number, Address, Fax Number and Email Address) – Complete if different from #5:

Environmental Quality Board, P.O. Box 8477, Harrisburg, PA 17105
Express Mail: Environmental Quality Board, Rachel Carson State Office Building, 16th Floor, 400 Market Street, Harrisburg, PA 17101-2301
Email: RegComments@state.pa.us

(All Comments will appear on IRRC's website)

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

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

(8) 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 three years, review and revise as necessary, their water quality standards. Pennsylvania's existing chloride criterion was developed primarily for the protection of potable water supplies. Although this criterion may be protective of instream aquatic life uses when applied, it is not applied in all waters of this Commonwealth, pursuant to 25 Pa. Code § 96.3(d). Therefore, the Department is recommending that the Board adopt the current national chloride criteria for the protection of aquatic life into Pennsylvania's Water Quality Standards on a state-wide basis. 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 EPA determined the criteria continuous concentration (CCC – four-day average) and the criteria maximum concentration (CMC – one-hour average) should not exceed 230 mg/l and 860 mg/l, respectively.

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

A. The date by which the agency must receive public comments:	Within 45 days of the published rulemaking.
B. The date or dates on which public meetings or hearings will be held:	Public meetings or hearings will be held if sufficient interest is generated.
C. The expected date of promulgation of the proposed regulation as a final-form regulation:	Within six months of the close of the comment period.
D. The expected effective date of the final-form regulation:	Upon publication as final in the Pa. Bulletin.
E. The date by which compliance with the final-form regulation will be required:	Upon publication as final in the Pa. Bulletin.
F. The date by which required permits, licenses or other approvals must be obtained:	The date is dependent on the rulemaking action.

(10) 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.

SECTION II: STATEMENT OF NEED

(11) 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.

(12) 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.

Although this regulation is not specifically mandated by Federal or State law or regulations, the federal Clean Water Act and 40 CFR 131.20 requires that states review their water quality standards and modify them, as appropriate, at least once every three years.

(13) 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.

Water quality standards are an important element of this Commonwealth's water quality management program in that they set general and specific goals for the quality of Pennsylvania's streams. The water quality standards can affect all sources of wastewater discharge since the Department must regulate these sources to ensure that the instream water quality standards are met. The standards are used as program objectives in the control of both point and nonpoint sources of pollution statewide for the benefit of all Pennsylvanians.

(14) If scientific data, studies, references are used to justify this regulation, please submit material with the regulatory package. Please provide full citation and/or links to internet source.

Attached is a chloride criteria development rationale document, which contains a summary of the Department's review of available scientific literature, including the EPA's *Ambient Water Quality Criteria for Chloride*. EPA 440/5-88-001. (available from: http://www.epa.gov/waterscience/criteria/library/ambientwqc/chloride1988.pdf)

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

Persons proposing new or expanded activities or projects which result in discharges of chloride to waters of this 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 this Commonwealth, may result in higher design engineering, construction and treatment costs to meet the more stringent criterion for chloride. The proposal will be implemented through the Department's permits and approval actions.

(16) 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 # 15. Persons proposing new or expanding activities or projects which result in impacts to the waters of this Commonwealth must comply with this regulation by providing the appropriate level of wastewater treatment for discharges or best management practices (BMPs) in these waters.

SECTION III: COST AND IMPACT ANALYSIS

(17) 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.

The Department has reviewed available treatment technologies and finds 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 that make them 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. 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.

(18) 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.

No costs will be imposed directly upon state or local governments by this regulation.

(19) 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 proposal is based on and will be implemented through existing Department programs, procedures and policies. There are no additional implementation costs associated with this regulation.

Regulatory Analysis Form

(20) 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 2009-10	FY +1 2010-11	FY +2 2011-12	FY +3 2012-13	FY +4 2013-14	FY +5 2014-15
SAVINGS:	$	$	$	$	$	$
Regulated Community	Not Measurable					
Local Government	"					
State Government	"					
Total Savings						
COSTS:	Not Measurable					
Regulated Community	"					
Local Government	"					
State Government	"					
Total Costs						
REVENUE LOSSES:	Not Measurable					
Regulated Community	"					
Local Government	"					
State Government	"					
Total Revenue Losses						

(20a) Provide the past three year expenditure history for programs affected by the regulation.

Program Year	FY -3 2006-2007	FY -2 2007-2008	FY -1 2008-2009	Current FY 2009-2010
Environmental Protection Operations (#160-10381)	$89,847,000	$98,574,000	$98,544,000	$85,069,000
Environmental Program Management (#161-10382)	$36,868,000	$39,685,000	$37,664,000	$32,694,000

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

The benefits from protecting the surface waters of this Commonwealth at the appropriate level and allowing for unrestricted access to all water uses will be recognized by all citizens of the Commonwealth through improved water quality that may result in reduced treatment costs for public drinking water supplies and increased recreational opportunities.

(22) 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 Department presented this proposed criterion to the Water Resources Advisory Committee (WRAC) at its October 7, 2009, meeting.

The public will be afforded an opportunity to comment on this proposal during a public comment period, which will also provide for public hearings if sufficient interest warrants.

(23) 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 alternative regulatory schemes to consider in achieving the correct level of protection for the aquatic life uses of waters of this Commonwealth due to the fact that the Potable Water Supply Use for this parameter is currently protected only at the point of existing or planned surface potable water supply withdrawals.

(24) 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 proposed regulations are not more stringent than the federal standards allow.

(25) 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. The proposed amendments will not put Pennsylvania at a competitive disadvantage to other states. Other states (including three in the mid-Atlantic region: Virginia, West Virginia and New Jersey) have already adopted the national aquatic life criteria for chloride of 230 mg/l and 860 mg/l for chronic and acute protection.

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

No other regulations or state agencies are affected by this proposal.

(27) 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.

(28) 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.

Water Quality Standards
Chloride (Ch) Criterion

25 Pa Code, Chapter 93

Change the symbol for the existing chloride criterion (from Ch to Ch_1) and add a new aquatic life criterion for chloride (Ch_2) to Table 3 at §93.7 (relating to Specific Water Quality Criteria).

Table 3

Parameter	*Symbol*	*Criteria*	*Critical Use**
		******	
Chloride	Ch_1	Maximum 250 mg/l.	PWS
	Ch_2	Four-day average 230 mg/l; 1-hour average 860 mg/l	CWF, WWF, TSF, MF

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CDL-1

FACE SHEET
FOR FILING DOCUMENTS
WITH THE LEGISLATIVE REFERENCE
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(Pursuant to Commonwealth Documents Law)

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INDEPENDENT REGULATORY
REVIEW COMMISSION

DO NOT WRITE IN THIS SPACE

Copy below is hereby approved as to form and legality.
Attorney General

By: _____
(Deputy Attorney General)

APR 19 2010
DATE OF APPROVAL

☐ Check if applicable
Copy not approved. Objections attached.

Copy below is hereby certified to be true and correct copy of a document issued, prescribed or promulgated by:

DEPARTMENT OF ENVIRONMENTAL PROTECTION
ENVIRONMENTAL QUALITY BOARD

(AGENCY)

DOCUMENT/FISCAL NOTE NO. 7-457

DATE OF ADOPTION MARCH 16, 2010

BY John Hanger

TITLE JOHN HANGER
CHAIRMAN

EXECUTIVE OFFICER CHAIRMAN OR SECRETARY

Copy below is hereby approved as to form and legality
Executive or Independent Agencies

BY _____
Andrew C. Clark
DATE OF APPROVAL MAR 26 2010

(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 PROPOSED RULEMAKING

DEPARTMENT OF ENVIRONMENTAL PROTECTION
ENVIRONMENTAL QUALITY BOARD

AMBIENT WATER QUALITY CRITERION – CHLORIDE

25 *Pa. Code*, Chapter 93

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 March 16, 2010.

A. Effective Date

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

B. Contact Persons

For further information, contact Roberta Radel, Bureau of Water Standards and Facility Regulation, Rachel Carson State Office Building, P.O. Box 8467, Harrisburg, PA 17105-8467, (717) 787-5017 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.

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 April 21, 2010, 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 June 15, 2010. 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 Board by June 15, 2010. 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 June 15, 2010.

JOHN HANGER,
Chairperson

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

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§ 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. 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
	Ch_2	**Four-day average 230 mg/l; 1-hour average 860 mg/l**	**CWF, WWF, TSF, MF**

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January 2010

EVALUATION OF WATER QUALITY CRITERIA FOR AQUATIC LIFE USE PROTECTION

CHLORIDE

Introduction

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 in-stream 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. Although this criterion may be protective of instream aquatic life uses when applied, it is not applied in all waters of the 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 potable water supply (PWS) criterion for chloride is included in Table 3 at 25 Pa. Code § 93.7 (relating to specific water quality criteria), and reads as follows:

§ 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. 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	Maximum 250 mg/l.	PWS
		**********	

*Critical Use: The designated or existing use the criteria are designed to protect. More stringent site-specific criteria may be developed to protect other more sensitive, intervening uses.

Pertinent scientific literature and historical data were reviewed and are discussed in detail in the following sections. This document presents the rationale and results of analyses conducted by the Pennsylvania Department of Environmental Protection (Department) during development of an aquatic life criterion for chloride.

Background of Chloride Criteria

Pennsylvania's current criterion for chloride dates back to 1967, when the Sanitary Water Board (a predecessor of the Department) included it to prevent objectionable taste and odor in drinking water, based on recommendations in the United States Public Health Service (US PHS) Drinking Water Standards of 1962. The US PHS recommended that chloride should not exceed 250 mg/L in the water supply where other more suitable supplies were or could be made available. The limits were influenced primarily by considerations of taste. The Environmental Protection Agency's (EPA) Secondary Maximum Contaminant Levels (SMCL's) under the Federal Safe Drinking Water Act, which became effective in 1979, are set at the same 250 mg/L level. The Commonwealth's drinking water program incorporated the Federal standards into Chapter 109 (relating to safe drinking water).

In 1985, Chapter 93 was amended to provide for an exception to the statewide application of water quality criteria at all points instream after mixing for four parameters: total dissolved solids, fluoride, nitrite-nitrate and phenolics (PADER, 1985). As a result, the point of application of these criteria was moved to existing or planned surface potable water supply withdrawals. Amendments adopted on November 18, 2000, through the Regulatory Basics Initiative (RBI) triennial review, moved the provision, without change, to § 96.3(d) (relating to water quality protection requirements) of the newly created Chapter 96 (relating to water quality standards implementation) (PADEP, 2000). Chloride and sulfate were added on December 14, 2002 so that there are now six exceptions to the statewide application of water quality criteria (PADEP, 2002). The 250 mg/L potable water supply (PWS) standard for chloride is applicable only at the point of all existing or planned surface potable water supply withdrawals, unless otherwise specified. The 250 mg/L PWS chloride criterion value for Pennsylvania remained unchanged throughout this process.

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 osmotic pressure (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 Osmotic Pressure (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 osmotic pressure adversely affect compliance monitoring.

TDS includes inorganic salts, organic matter and other dissolved materials in water. They can be naturally present in water or the result of mining or some industrial or municipal treatment of water. TDS contain minerals and organic molecules that provide benefits such as nutrients, but also may contain contaminants such as toxic metals and organic pollutants. The concentration and composition of TDS in natural waters is determined by the geology of the drainage, atmospheric precipitation and the water balance (evaporation/precipitation).

TDS cause toxicity through increases in salinity, changes in the ionic composition of the water, and toxicity of individual ions. The composition of specific ions determines toxicity of elevated TDS in natural waters. Also, as the hardness increases, TDS toxicity may decrease. The major concern associated with high TDS concentrations relates to direct effects of increased salinity on the health of aquatic organisms.

Chlorides and Sulfates can be a significant source of TDS in wastewater discharges. During the fall of 2008, water quality issues related to these parameters emerged in the Monongahela River basin. While river flows reached seasonal lows, the concentrations of TDS and sulfates in the river increased to historic highs, exceeding the water quality standards at all of the seventeen Potable Water Supply (PWS) intakes from the border with West Virginia to Pittsburgh. Violations of water quality standards for TDS and Sulfates persisted in the river through November and December of 2008. Elevated Chloride levels were also observed in the Monongahela and at least one major tributary – South Fork Tenmile Creek. This sequence of events identifies a need to establish a chloride criterion for the protection of aquatic life at all locations on Pennsylvania surface waters.

Characteristics of Chloride

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 (Buchwalter and Luoma 2005). 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 (Pond, et al. 2008).

Pennsylvania River Basin Commissions -- Chloride Criteria

Pennsylvania's water quality regulations require the application of any more stringent water quality standards developed by other agencies under interstate compacts or international agreements.

The ***Delaware River Basin Commission (DRBC)*** has classified certain waters as special protection. These special protection waters received this designation because they have exceptionally high scenic, recreational, ecological, and/or water supply value. Special protection waters can either be classified as Outstanding Basin Waters or Significant Resource Waters. According to DRBC's regulations, there shall be no measurable change in the existing water quality of special protection waters. A measurable change is defined as a statistically significant change in the concentration of pollutants. Existing water quality is defined by a set of parameters in Tables 1 and 2 of the DRBC Water Quality Regulations. All referenced median chloride levels are less than 50 mg/L. Following is a list of the special protection waters from the DRBC Water Quality Regulations (3.10.3.A.2.g) (DRBC, 2008):

g. Classified Special Protection Waters

1) The following stream reaches are classified as Outstanding Basin Waters:
   - (a) The Upper Delaware Scenic and Recreational River (Delaware River between River Mile 330.7 and 258.4);
   - (b) Those portions of intrastate tributaries located within the established boundary of the Upper Delaware Scenic and Recreational River Corridor;
   - (c) The Middle Delaware Scenic and Recreational River (Delaware River between River Miles 250.1 and 209.5);
   - (d) Those portions of tributaries located within the established boundary of the Delaware Water Gap National Recreation Area.

2) The following stream reaches are classified as Significant Resource Waters:
   - (a) The Delaware River between River Miles 258.4 (the downstream boundary of the Upper Delaware Scenic and Recreational River) and 250.1 (the upstream boundary of the Delaware Water Gap National Recreation Area);
   - (b) The Lower Delaware River between River Miles 209.5 (the downstream boundary of the Delaware Water Gap National Recreation Area) and 134.34 (the Calhoun Street Bridge near the Head of Tide at Trenton, NJ).

In addition to the previously described special protection waters, DRBC has established specific aquatic life use criteria for chloride based on the naturally dilute background levels of the Delaware River for two zones (DRBC, 2008).

- **ZONE 2** is that part of the Delaware River extending from the head of tidewater at Trenton, New Jersey, R.M. (River Mile) 133.4 (Trenton-Morrisville Toll Bridge) to R.M. 108.4 below the mouth of Pennypack Creek, including the tidal portions of the tributaries thereof. **Maximum 15-day average 50 mg/l.**

- **ZONE 3** is that part of the Delaware River extending from R.M. 108.4 to R.M. 95.0 below the mouth of Big Timber Creek, including the tidal portions of the tributaries thereof. **Maximum 30-day average concentration of 180 mg/l.**

The ***Ohio River Valley Water Sanitation Commission (ORSANCO)*** has established human health criteria for the Ohio River main stem at 250 mg/L for chloride. The Commission has also adopted the Tier I and Tier II methodologies (ORSANCO's Pollution Control Standards, Appendix D) as the mechanisms for Great Lakes states and tribes to derive aquatic life criteria (including chloride). The Tier I methodology (eight family approach) is equivalent to the *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, PB85-227049 (Stephan et al., 1985). If the minimum data requirements for the Tier I methodology are not met, aquatic life values can be calculated based upon the Tier II approach, as outlined in Appendix D and the US EPA *Water Quality Guidance for the Great Lakes System* published in the Federal Register on March 23, 1995 (US EPA, 1995).

The ***Susquehanna River Basin Commission (SRBC), Interstate Commission on the Potomac River Basin (ICPRB)*** and the ***Great Lakes Commission (GLC)*** do not maintain or develop specific water quality criteria, and have not adopted chloride criteria for the protection of aquatic life.

The Great Lakes Water Quality Agreement, 1978 (GLWQA) is an international agreement between the United States and Canada that was first signed in 1972 and renewed in 1978. The GLWQA expresses the commitment of each country to restore and maintain the chemical, physical and biological integrity of the Great Lakes Basin Ecosystem and includes a number of objectives and guidelines, including water quality criteria to achieve these goals. This agreement is administered by the International Joint Commission (IJC), and by Pennsylvania's Office of the Great Lakes for the Commonwealth's portion of Lake Erie. Although the GLWQA does not contain specific chloride criteria for the protection of aquatic life, as described earlier and as adopted by ORSANCO, there are provisions to develop aquatic life criteria using the EPA Great Lakes Tier II approach. This approach could be used to develop site-specific chloride criteria for waters within the Great Lakes System, and may be applicable for other waters throughout the Commonwealth.

Discussion / Rationale for Chloride Criteria

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. The findings of 106 published scientific studies were considered in the development of the national aquatic life criteria for chloride. 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 pollutants. The Criteria Continuous Concentration (CCC) and Criteria Maximum Concentration (CMC) values should not be exceeded more than once every three years on the average (US EPA, 1988).

The 4-day average (CCC) criterion = 230 mg/l
The 1-hour average (CMC) criterion = 860 mg/l

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. Much research has been conducted subsequent to the US EPA 1988 national recommendation that continues to indicate the need for an aquatic life criterion for chloride. Scientists at the US EPA are currently conducting research to determine if the national criterion for chloride should be updated. The Department recommends adopting this current national aquatic life criteria (230 mg/L = chronic; 860 mg/L = acute) for chloride until new national aquatic life criteria are available for consideration.

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US EPA (US ENVIRONMENTAL PROTECTION AGENCY). 1988. Ambient water quality criteria for chloride. EPA 440/5-88-001. (available from: <http://www.epa.gov/waterscience/criteria/library/ambientwqc/chloride1988.pdf>).

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pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
POLICY OFFICE

April 21, 2010

Mr. Kim Kaufman, Executive Director
Independent Regulatory Review Commission
14th Floor
333 Market Street
Harrisburg, PA 17120

Re: Proposed Rulemaking – Ambient Water Quality Criterion – Chloride (#7-457); and
Proposed Rulemaking – Coal Mining Program Amendments (#7-458)

Dear Mr. Kaufman:

Pursuant to Section 5(a) of the Regulatory Review Act, please find enclosed copies of two proposed regulations for review and comment by the Independent Regulatory Review Commission. Both proposals are scheduled for publication in the *Pennsylvania Bulletin* on May 1, 2010, with a 45-day public comment period for the proposed Ambient Water Quality Criterion – Chlorides rulemaking, and a 30-day public comment period for the proposed Coal Mining Program Amendments rulemaking. The Environmental Quality Board (EQB) adopted these proposals on March 16, 2010.

The proposed Ambient Water Quality Standards for Chloride rulemaking amends 25 *Pa Code* Chapter 93 by adding a new aquatic life criterion for chloride. Current water quality standards in Chapter 93 include criterion for chloride; however, the criterion was developed primarily for the protection of drinking water supplies and is applicable only at the point of water withdrawal. Although the current water quality criterion for chloride is protective of instream aquatic life uses when applied, it is not applied in all waters of this Commonwealth. Therefore, to ensure protection of aquatic life in all waters of the state, the Department is recommending through this rulemaking the addition of ambient water quality criterion for chloride. The chloride standard included in the proposed rulemaking is the current national chloride criteria for the protection of aquatic life as recommended by the U.S. EPA in their February 1988 publication *Ambient Water Quality Criteria for Chloride*. The EPA determined the criteria continuous concentration (CCC- four-day average) and the criteria maximum concentration (CMC – one-hour average) should not exceed 230 mg/l and 860 mg/l, respectively. This criterion is included in the Department's regulatory proposal, which when finalized, will be implemented through the Department's permit and approval actions.

The purpose of the proposed Coal Mining Program Amendments rulemaking is two-fold. First, the proposal addresses regulatory program deficiencies identified by the Federal Office of Surface Mining Reclamation and Enforcement (OSMRE), which has oversight authority over Pennsylvania's coal mining program. A majority of the deficiencies that are addressed in this rulemaking are minor and include modifications that are needed to ensure that state regulations are consistent with and as

effective as federal regulations. The regulatory deficiencies must be addressed in order for Pennsylvania to retain regulatory authority for its coal mining program. If program deficiencies are not resolved to the satisfaction of OSMRE, the Commonwealth is at risk for losing or receiving less federal funding for the Abandoned Mine Land Reclamation program. Second, the rulemaking includes improvements to the Remining Financial Guarantee program, which are needed because of the transition in the coal mining bonding program from an alternate bonding system, which used acre-based bond rates, to a conventional bonding system where the bond amount is based on the actual costs of reclamation. The changes proposed in the rulemaking are not expected to increase or add costs to the regulated community. The Department's Mining and Reclamation Advisory Board reviewed the proposed rulemaking on October 22, 2009.

The Department will provide the Commission with the assistance required to facilitate a thorough review of these proposals. Section 5(d) of the Regulatory Review Act provides that the Commission may, within 30 days of the close of the comment period, covey its comments, recommendations and objections to the proposed regulation. The Department will consider any comments, recommendations or suggestions made by the Commission, as well as the Committees and public commentators, prior to final adoption of these rulemakings.

Please contact me at the number above 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- 457

SUBJECT: Ambient Water Quality Criterion – Chloride

AGENCY: DEPARTMENT OF ENVIRONMENTAL PROTECTION

RECEIVED
APR 21 2010
4:00pm
INDEPENDENT REGULATORY REVIEW COMMISSION

TYPE OF REGULATION

- [x] 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

FILING OF REGULATION

DATE	SIGNATURE	DESIGNATION
4-21-10	Lorraine Chow	Majority Chair, HOUSE COMMITTEE ON ENVIRONMENTAL RESOURCES & ENERGY Rep. Camille George
4-21-10	R Watters	Minority Chair, HOUSE COMMITTEE ON ENVIRONMENTAL RESOURCES & ENERGY
4-21-10	B. Castello	Majority Chair, SENATE COMMITTEE ON ENVIRONMENTAL RESOURCES & ENERGY Senator Mary Jo White
4-21-10	A. Rybarczyk	Minority Chair, SENATE COMMITTEE ON ENVIRONMENTAL RESOURCES & ENERGY
4/21/10	K Cooper	INDEPENDENT REGULATORY REVIEW COMMISSION
		ATTORNEY GENERAL (for Final Omitted only)
4/21/10	M. L. Mhrof	LEGISLATIVE REFERENCE BUREAU (for Proposed only)