BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

RECEIVED
CLERK'S OFFICE
DEC 0 2 2010
STATE OF ILLINOIS
Pollution Control Board

IN THE MATTER OF:	)	
	)	
UPDATED WATER QUALITY	)	R11- 18
STANDARDS FOR BORON, FLUORIDE	)	(Rulemaking – Water)
AND MANGANESE: PROPOSED	)	
AMENDMENTS TO 35 Ill. Adm. Code	)	
Part 302, Subparts B, C, E and F and	)	
Section 303.312	)	

NOTICE OF FILING

John Therriault, Clerk
Illinois Pollution Control Board
James R. Thompson Center
100 West Randolph Street, Suite 11-500
Chicago, Illinois 60601

Division Chief of Environmental Enforcement
Office of the Attorney General
100 W. Randolph Street, Suite 1200
Chicago, Illinois 60601

Office of Legal Services
Illinois Department of Natural Resources
One Natural Resources Way
Springfield, Illinois 62702-1271

PLEASE TAKE NOTICE that I have filed today with the Office of the Clerk of the Illinois Pollution Control Board the Motion for Acceptance; Appearance; Certificate of Origination; Statement of Reasons and Attachments; and Proposed Amendments to 35 Ill. Adm. Code Part 302, Subparts B, C, E and F of the Illinois Environmental Protection Agency, a copy of which is herewith served upon you.

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

By: _____
Deborah J. Williams
Assistant Counsel

Dated: 12/1/10

1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276
(217) 782-5544

RECEIVED
CLERK'S OFFICE
DEC 0 2 2010
STATE OF ILLINOIS
Pollution Control Board

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
UPDATED WATER QUALITY	)	R11-18
STANDARDS FOR BORON, FLUORIDE	)	(Rulemaking – Water)
AND MANGANESE: PROPOSED	)	
AMENDMENTS TO 35 Ill. Adm. Code	)	
Part 302, Subparts B, C, E and F and	)	
Section 303.312	)	

MOTION FOR ACCEPTANCE

NOW COMES the Illinois Environmental Protection Agency ("Illinois EPA"), by and through its attorney, Deborah J. Williams, and pursuant to 35 Ill. Adm. Code 102.106, 102.200, and 102.202, moves that the Illinois Pollution Control Board ("Board") accept for hearing the Illinois EPA's proposal for the adoption of amendments to 35 Ill. Adm. Code Parts 301, 302, 303 and 304. This regulatory proposal includes:

1. Notice of Filing;
2. Appearance of Attorney for the Illinois Environmental Protection Agency;
3. Certification of Origination;
4. Statement of Reasons (including list of attachments and documents relied on);
5. Attachments to the Statement of Reasons;
6. Proposed Amendments;
7. Proof of Service;

8. Computer disc containing Proposed Amendments.

Respectfully Submitted,

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

By: _____
Deborah J. Williams
Assistant Counsel
Division of Legal Counsel

Dated: 11/30/10

1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

(217) 782-5544

RECEIVED
CLERK'S OFFICE
DEC 02 2010
STATE OF ILLINOIS
Pollution Control Board

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
UPDATED WATER QUALITY	)	R11-18
STANDARDS FOR BORON, FLUORIDE	)	(Rulemaking – Water)
AND MANGANESE: PROPOSED	)	
AMENDMENTS TO 35 Ill. Adm. Code	)	
Part 302, Subparts B, C, E and F and	)	
Section 303.312	)	

APPEARANCE

The undersigned, as one of its attorneys, hereby enters her appearance on behalf of the Illinois Environmental Protection Agency.

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

By: Deborah J. Williams

Deborah J. Williams
Assistant Counsel
Division of Legal Counsel

Dated: 11/30/10

1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276
(217) 782-5544

RECEIVED
CLERK'S OFFICE
DEC 0 2 2010
STATE OF ILLINOIS
Pollution Control Board

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
UPDATED WATER QUALITY	)	R11- 18
STANDARDS FOR BORON, FLUORIDE	)	(Rulemaking – Water)
AND MANGANESE: PROPOSED	)	
AMENDMENTS TO 35 Ill. Adm. Code	)	
Part 302, Subparts B, C, E and F and	)	
Section 303.312	)	

CERTIFICATION OF ORIGINATION

NOW COMES the Illinois Environmental Protection Agency to certify in accordance with 35 Ill. Adm. Code. 102.202(i) that this proposal amends the most recent version of Part 302, Subparts B, C, E and F and Section 303.312 of the Pollution Control Board's regulations, as published on the Board's web site at http://www.ipcb.state.il.us/SLR/IPCBandIEPAEnvironmentalRegulations-Title35.asp.

Respectfully Submitted,

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

By: _____

Deborah J. Williams
Assistant Counsel
Division of Legal Counsel

Dated: 11/30/10

1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276
(217) 782-5544

RECEIVED
CLERK'S OFFICE

DEC 12 2011

STATE OF ILLINOIS
Pollution Control Board

RECEIVED
CLERK'S OFFICE
DEC 02 2010
STATE OF ILLINOIS
Pollution Control Board

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
UPDATED WATER QUALITY	)	R11-18
STANDARDS FOR BORON, FLUORIDE	)	(Rulemaking – Water)
AND MANGANESE: PROPOSED	)	
AMENDMENTS TO 35 Ill. Adm. Code	)	
Part 302, Subparts B, C, E and F and	)	
Section 303.312	)	

STATEMENT OF REASONS

The Illinois Environmental Protection Agency ("Illinois EPA" or "Agency") hereby submits its Statement of Reasons for the above captioned rulemaking to the Illinois Pollution Control Board ("Board") pursuant to Section 27 of the Environmental Protection Act ("Act") [415 ILCS 5/27] and 35 Ill. Adm. Code 102.200 and 102.202.

I. INTRODUCTION AND STATUTORY AUTHORITY

Pursuant to the Federal Water Pollution Control Act (hereinafter "Clean Water Act"), it is the primary responsibility of the States to set water quality standards for intrastate waters and submit changes to those standards to U.S. EPA for approval. 33 U.S.C. §1313. Clean Water Act Section 303 provides that "the State water pollution control agency . . . shall from time to time (but at least once each three year period beginning with October 18, 1972) hold public hearings for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards." 33 U.S.C. 1313(c)(1). This requirement to periodically review and update standards is commonly referred to as the "triennial review" requirement. This proposal is a culmination of the Illinois EPA's obligation to conduct a triennial review and includes updated

water quality standards for boron, fluoride and manganese and a handful of clean-up amendments and updates to Part 302 of the Board's regulations and a repeal of Section 303.312.

Section 5(c) of the Act gives the Board "authority to act for the State in regard to the adoption of standards for submission to the United States under any federal law respecting environmental protection. Such standards shall be adopted in accordance with Title VII of the Act and upon adoption shall be forwarded to the Environmental Protection Agency for submission to the United States . . . " 415 ILCS 5/5(c). The Agency is given the responsibility under Section 4(l) of the Act to transmit the standards adopted by the Board to the United States Environmental Protection Agency ("U.S. EPA") for approval where required by federal law. 415 ILCS 5/4(l).

In the provisions specific to protection of waters of the State, Section 13(a) of the Act provides that

> The Board, pursuant to procedures prescribed in Title VII of this Act, may adopt regulations to promote the purposes and provisions of this Title. Without limiting the generality of this authority, such regulations may among other things prescribe: (1) Water quality standards specifying among other things, the maximum short-term and long-term concentrations of various contaminants in the waters, the minimum permissible concentrations of dissolved oxygen and other desirable matter in the waters, and the temperature of such waters; ...

415 ILCS 5/13(a).

The contents of this regulatory proposal are within the general substantive rulemaking authority conferred upon the Board under Sections 27 and 13(a) of the Act. This proposal is also one of general applicability pursuant to Sections 27 and 28 of the Act and Section 5-40 of the Illinois Administrative Procedure Act. 415 ILCS 5/27 and 28, 5 ILCS 100/5-40, 35 Ill. Adm. Code 102.106(a)(3) and (b)(1). In evaluating these proposed rules, the Board is required to take into account "the existing physical conditions, the character of the area involved, including the

character of surrounding land uses, zoning classifications, the nature of the existing air quality, or receiving body of water, as the case may be, and the technical feasibility and economic reasonableness of measuring or reducing the particular type of pollution." 415 ILCS 5/27(a).

This Statement of Reasons will address the purpose and effect of this regulatory proposal and outline the specific amendatory language being proposed. A technical support document was prepared by the Bureau of Water in support of the proposed changes to the boron, fluoride and manganese water quality standards and is included as Attachment 1 to this Statement of Reasons.

II. REGULATORY PROPOSAL: PURPOSE AND EFFECT

A. History of the Existing Boron, Fluoride and Manganese water quality standards

The existing General Use and Lake Michigan Basin Standards for boron, fluoride, and manganese were adopted by the Board in its 1972 standards rulemaking establishing the initial Board water quality standards and have not been updated since that time. *See*, R71-14 (March 7, 1972). The existing General Use and non-open water Lake Michigan Basin standard for boron is 1.0 mg/L. The existing General Use and non-open water Lake Michigan Basin standard for fluoride is 1.4 mg/L. The existing General Use and non-open water Lake Michigan Basin standard for manganese is 1.0 mg/L.

The Open Waters of Lake Michigan standards are based on background conditions of Lake Michigan rather than protection of human health or aquatic life. The existing manganese standard is 0.15 mg/L and will remain unchanged. Presently there are no boron or fluoride standards specifically adopted for the Open Waters of Lake Michigan, therefore the existing non-open waters Lake Michigan Basin Standards for these substances are applicable in these waters.

The Secondary Contact and Indigenous Aquatic Life standards for fluoride and manganese are 15 mg/L and 1 mg/L, respectively. No standard for this designated use currently exists for boron. At this time, the Agency intends to address all standards for Secondary Contact and Indigenous Aquatic Life Use waters in the "Use Attainability Analysis of the Des Plaines and Chicago Waterways" rulemaking. *See*, R08-09 (Sub-Docket D).

There are no existing Public and Food Processing Water Supply standards for boron or fluoride, therefore the General Use standards for these substances are applicable in these waters and are protective of Public and Food Processing Water Supply use. The existing Public and Food Processing Water Supply standard for manganese is 0.15 mg/L, which is based on aesthetics rather than human health.

B. Purpose and Effect of the Proposal

1. Boron, Fluoride and Manganese Water Quality Standards

The Agency's rulemaking proposal updates the water quality standards for boron, fluoride and manganese. Changes are proposed to the General Use standard itself as well as the to the Public and Food Processing Water Supply standards in Subpart C of Part 302 and the Lake Michigan standards in Subpart E of Part 302.

With no existing Public and Food Processing Water Supply water quality standards for boron or fluoride, the existing General Use standards for these substances are applied to these waters by default. As the Board stated in R71-14 "Since general criteria apply to all waters designated for public supply, the present regulation omits separate requirements for those parameters whose general standards are tight enough to protect public supplies; boron, chromium, copper, fluoride, mercury, silver and zinc." *See*, R71-14, March 7, 1972, Slip. Op. at 9. Since the proposed new General Use standards for boron and fluoride are higher than the

existing standards of 1.0 mg/L and 1.4 mg/L, respectively, Illinois EPA is proposing to designate 1.0 mg/L boron and 1.4 mg/L fluoride as Public and Food Processing Water Supply standards. The proposed standards would be applied at the point of surface water intake and would be regulated as one-number, not to be exceeded standards. Because there are no specific Open Waters of Lake Michigan standards for boron and fluoride in Subtitle E, the Lake Michigan Basin standards for these substances are currently applicable. Relocating the existing Lake Michigan Basin standards of 1.0 mg/L boron and 1.4 mg/L fluoride into the Open Waters of Lake Michigan standards will provide a measure of protection against harmful loadings of these substances within these waters, and will continue to allow protection of these waters for Public and Food Processing Water Supply uses.

For manganese, the Public and Food Processing Water Supply and Open Waters of Lake Michigan standards are presently set at 0.15 mg/L. Open Waters of Lake Michigan standards are based on background conditions of Lake Michigan rather than protection of human health or aquatic life, therefore the existing manganese standard for these waters will remain unchanged.

Public and Food Processing Water Supply standards are intended to represent the maximum allowable concentration of a substance at the point of surface water intake that will allow for attainment of the finished drinking water maximum contaminant level ("MCL") for that substance following conventional treatment. As explained in the Agency's technical support document (Attachment 1, pages 9-12), the existing manganese Public and Food Processing Water Supply standard of 0.15 mg/L is overly protective of the finished manganese standard, as the finished MCL of 0.15 mg/L can easily be attained following conventional treatment of surface waters containing greater than 0.15 mg/L manganese. Because manganese often occurs in Illinois at concentrations above the existing water quality standards, the Public and Food

Processing Water Supply standard is exceeded in many surface waters with public water supply intakes and Illinois EPA has been forced to list these waters on the Clean Water Act Section 303(d) list and establish Total Maximum Daily Loads ("TMDL") unnecessarily for waters with naturally occurring sources of manganese that will be adequately addressed by conventional drinking water treatment. By conservatively estimating that 90% of manganese can be removed at conventional utilities in Illinois, and back-calculating the amount of manganese in surface waters that would still allow for attainment of the 0.15 mg/L finished MCL, it is apparent that a maximum surface water concentration of 1.5 mg/L would be sufficiently protective of the Public and Food Processing Water Supply use designation. However, in order to provide an additional measure of conservancy, the Agency is proposing to set the new manganese Public and Food Processing Water Supply standard at 1 mg/L (total manganese). The standard would be applied at the point of surface water intake and would be regulated as a one-number, not to be exceeded standard.

The proposed updates to the General Use and Lake Michigan Basin water quality standards for boron, fluoride and manganese were developed using U.S. EPA guidelines for deriving numerical water quality criteria. *See*, Attachment 1, Exhibit F. The U.S. EPA "1985 Guidelines" methodology is commonly used to derive state standards and U.S. EPA national criteria documents for substances that are toxic to aquatic life. This conventional methodology was used in deriving acute and chronic standards for boron, fluoride, and manganese. Given that fluoride and manganese toxicity is known to be influenced by the hardness of test water, standards for these substances were developed to account for hardness-dependent relationships. Literature reviews and additional laboratory tests studying the influence of water chemistry on

boron toxicity had confounding results, therefore boron standards were developed independent of water chemistry.

The newly derived boron, fluoride and manganese standards were the result of collaborative work between the Agency, U.S. EPA and Dr. David Soucek of Illinois Natural History Survey (INHS). A literature review compiled by the Agency determined that insufficient data was available to derive Tier I acute and chronic standards for each substance, therefore it was necessary to conduct toxicity tests to supplement the dataset for each parameter. The Agency consulted with U.S. EPA to determine which test organisms would best fill the data gaps in order to derive fully protective aquatic life standards. U.S. EPA then contracted Great Lakes Environmental Commission (GLEC) and INHS to conduct toxicity tests on boron (acute tests using the fathead minnow *Pimephales promelas* (variable pH), *Ceriodaphnia dubia*, and the freshwater mussels *Lampsilis siliquoidea*, *Ligumia recta*, and *Megalonaias nervosa*; chronic test using *Pimephales promelas*), fluoride (acute tests using the fingernail clam *Sphaerium simile* and the amphipod *Hyalella azteca*) and manganese (acute tests using *Lampsilis siliquoidea* and *Megalonaias nervosa*). *See* Attachment 6. The Agency additionally contracted INHS to conduct additional toxicity tests on boron (acute tests using the stonefly *Allocapnia vivipara*, *Sphaerium simile*, *Pimephales promelas*, the waterflea *Ceriodaphnia dubia* (variable hardness and pH) and *Hyalella azteca* (variable hardness and pH); chronic tests using *Pimephales promelas* and *Hyalella azteca*), fluoride (acute and chronic tests using *Hyalella azteca*), and manganese (acute and chronic tests using *Hyalella azteca*). *See,* Attachment 1, Exhibit U.

Standards for each substance were then developed in accordance with 1985 Guidelines methodology. The following is a general overview of the 1985 Guidelines procedures used in

deriving the proposed standards. Further detail regarding the additional procedures required for deriving the hardness-based fluoride and manganese standards is provided in Attachment 1.

Only data from toxicity tests conducted on appropriate organisms using valid test methods, appropriate laboratory waters, and proper endpoints were used in deriving the proposed standards. For each substance, acute data expressed as an LC50 (concentration lethal to 50 percent of the tested organisms) was compiled for each species and was used to develop a Genus Mean Acute Value (GMAV) for each genus. The GMAVs were ranked by sensitivity and were used to develop the Final Acute Value (FAV). The FAV is the value protective of at least 95% of species at the LC50 level of effect. The FAV was then divided by 2 in order to convert the acute value from an LC50 level of protection to a level that is protective at the no observable adverse effect level.

Chronic standards for boron and fluoride were developed using the Acute-Chronic Ratio (ACR) approach, which requires ACRs from animals in at least three different families of which one species is a fish, one species is an invertebrate, and one is an acutely sensitive freshwater species. An ACR is calculated by dividing the acute LC50 of a species by the Maximum Acceptable Toxicant Concentration (MATC) of the same species derived from a test conducted in the same laboratory under test conditions identical to the acute test. The Final Acute-Chronic Ratio (FACR) was then calculated by taking the geometric mean of all available ACRs for each species. Chronic standards were then obtained by dividing the FAV of each substance by the FACR. The chronic manganese standard was not developed using the ACR approach because the resulting standard was not protective of *Hyalella azteca*, the most sensitive species. Rather, the chronic manganese standard was based off the *Hyalella azteca* MATC to afford proper protection for this organism and other untested, closely related organisms.

The procedures used by Illinois EPA in deriving acute and chronic standards for all three parameters are described in more detail in Attachment 1.

2. Other Proposed Changes to Part 302 and 303

In addition to the updated water quality standards, the Agency is proposing a handful of minor amendments to Part 302.

a. Derived Water Quality Criteria publication requirement

In R88-21(A) the procedures in Subpart F of Part 302 for deriving site-specific water quality criteria for toxic parameters were adopted by the Board. One important procedural component of this method for establishing criteria was to require periodic public notice of the criteria that have been developed. In R97-25, parallel procedures were included in Subpart E for publication of derived criteria developed for the Lake Michigan Basin.

The Agency is required to and does publish notice of derived water quality criteria in the Illinois Register every quarter pursuant to 302.595 for Lake Michigan Basin criteria for bioaccumulative chemicals of concern and pursuant to 302.669 for all other toxicity criteria derived pursuant to Subpart F. The Agency has also maintained a list of derived criteria on its website. The Agency is proposing to simply change the required method of public notice to updating the list on its website not less frequently than quarterly, rather than requiring publication in the Illinois Register.

b. Correction to Error in Zinc General Use water quality standard derivation

The existing General Use chronic water quality standard for zinc is hardness-based and was adopted by the Board in the R02-11 rulemaking. *See, In the Matter of Water Quality Triennial Review: Amendments to 35 Ill. Adm. Code 302.105, 302.208(e)-(g), 302.504(a),*

302.575(d), 309.141(h); and Proposed 35 Ill. Adm. Code 301.267, 301.313, 301.413, 304.120, and 309.157, R02-11 (December 19, 2002). During the R02-11 proceeding, the Agency identified a number of mathematical and clerical errors in its proposal to the Board by submittal of three different Errata Sheets. *See*, Attachment 8. In Errata Sheet Number 3, the Agency addressed corrections to the zinc values in its original proposal that were eventually adopted by the Board. The Agency has discovered an additional error in the chronic water quality standard for zinc that was not identified in the R02-11 proceeding.

An error was made in regards to the chronic toxicity value reported by the Agency for *Hyalella azteca*. This value was taken from Table 2 of Borgmann et al. 1993 which is included as Attachment 1, Exhibit W to this Statement of Reasons. A transcription error resulted in the Agency using an incorrect value from that Table in its derivation of the chronic zinc water quality standard. An explanation of the error is provided on page 22 of Attachment 1 and both the incorrect and corrected values and equations are provided in Attachment 1, Exhibit X. Due to this change, the intercept value in the equation representing the chronic zinc standard must be modified from A = -0.8165 to A = -0.4456. The adopted chronic value for *Hyalella azteca* was erroneously calculated and resulted in a chronic zinc standard that was not representative of the true dataset and the Agency is proposing that the Board correct this error.

c. Elimination of STORET references

STORET is defined in Section 301.405 as "the national water quality data system of the federal Environmental Protection Agency." STORET codes, as they appear in current Board water quality standards, are no longer maintained and updated by U.S. EPA, therefore they are of little use in instructing the reader on what form of the substance is regulated. Because the STORET database is no longer being supported by U.S. EPA, the Agency is proposing to drop

STORET codes from throughout the regulations when those regulations are opened for other amendments.

d. Corrected cross-references

In developing these amendments, the Agency discovered a handful of typographical errors in cross references. Those incorrect or outdated cross-references were found in Sections 302.303, 302.553, 302.648, 302.657.

e. Language Clarification in 302.208

In addition to changes to the water quality standards in 302.208, the Agency is proposing to reorganize the language in each paragraph to more clearly identify how the acute, chronic, human health and single-value standards are interpreted. These changes generally involve splitting up the language in existing subsection (d) into the applicable language in subsections (a) through (c). In addition, language is added to subsection (d) to clarify the interpretation of the single-value standards in subsections (g) and (h). *See* below for the specific changes proposed.

f. Clarifications of references to Cyanide, Mercury, Chloride and Toluene in Tables

The Agency is proposing a handful of amendments to clarify the applicability of the water quality standards for toxic parameters. In 302.208, the Agency has proposed changing the term "metal" to "chemical constituent" to make clear that not all of the parameters regulated in that Section are metals.

For mercury and chloride, the Agency has proposed adding the phrase "(total)" following the parameter in the tables to clarify that the substance is regulated in its total form, rather than dissolved forms. For chloride, this is done to create consistency throughout the Board's water quality standard regulations. For mercury, it is done to clarify that, unlike the aquatic life standards which are based on dissolved mercury, the human health standard for mercury relies

on total mercury given the potential for total mercury to become methylated and subsequently bioaccumulate in aquatic life.

The current General Use standard does not specify the form of cyanide, but it is interpreted as allowing either of two test methods for cyanide: the weak acid dissociable (WAD) form or the available form. Currently, the Lake Michigan Basin standards in Subpart E of Part 302 refer to the weak acid dissociable (WAD) form, while the total form is used in the existing Secondary Contact and Indigenous Aquatic Life standard and the effluent standard of 0.10 mg/L. Total Cyanide refers to all of the CN groups in cyanide compounds that can be determined as the cyanide ion (CN^-). Available cyanide consists of cyanide ion (CN^-), hydrogen cyanide in water (HCN_{aq}) and the cyano-complexes of zinc, copper, cadmium, mercury, nickel, and silver. Cyanide (WAD) is the hydrogen cyanide (HCN) that is liberated from a slightly acidified (pH 4.5 to 6.0) sample under the prescribed distillation conditions. Total cyanide and cyanide (WAD) are determined using standard methods, while available cyanide methods are taken from EPA-821-R-99-013 (August 1999). The Agency is proposing clarifications in both the Lake Michigan and General Use standards that clarify that the WAD and available cyanide are the two forms of cyanide tests that may be used in assessing attainment with the General Use cyanide water quality standard.

Two minor changes are proposed to the toluene standards in Part 302.Subpart E. In 302.504(a), the table mistakenly identifies the toluene standard in milligrams per liter, rather than micrograms per liter. In addition, the toluene standard in 302.504(d) is proposed for deletion because it is less stringent than the acute standard in 302.504(a) and therefore unnecessary. In R02-11, the Board updated the toluene standard in 302.504(a) to include the acute and chronic standards of 2,000 and 610 respectively. This standard was published and adopted in error in

milligrams per liter units instead of micrograms per liter. To demonstrate that this was merely a typographical error, the Agency directs the Board to the transcript of the March 6, 2002 hearing in R02-11 where the Board questions for the Agency witnesses correctly identified the toluene standard proposed as being measured in micrograms per liter. *See*, R02-11, Hearing Transcript, March 6, 2002, pp. 104-105.

g. Repeal of Section 303.312

As explained in more detail below, the Agency has proposed repeal of a site-specific fluoride standard in 303.312 as obsolete and inconsistent with the new water quality standards.

III. REGULATORY PROPOSAL: REGULATORY LANGUAGE

The Agency is proposing additions and changes to 35 Ill. Adm. Code Part 302 and one change to Part 303. The specific Sections affected are Sections 302.208, 302.303, 302.304, 302.504, 302.553, 302.595, 302.648, 302.657, 302.669 and 303.312.

SUBPART B: GENERAL USE WATER QUALITY STANDARDS

All of the proposed language changes in Part 302, Subpart B are contained in Section 302.208. The relevant amendments are included below for reference with the exception of the deletion of STORET numbers in the Tables.

Section 302.208 Numeric Standards for Chemical Constituents

a) The acute standard (AS) for the chemical constituents listed in subsection (e) shall not be exceeded at any time except for those waters for which a zone of initial dilution (ZID) applies pursuant to Section 302.102~~as provided in subsection (d)~~.

b) The chronic standard (CS) for the chemical constituents listed in subsection (e) shall not be exceeded by the arithmetic average of at least four consecutive samples collected over any period of at least four days, except for those waters

in which the Agency has approved a mixing zone or allowed mixing pursuant to Section 302.102~~as provided in subsection (d)~~. The samples used to demonstrate attainment or lack of attainment with a CS must be collected in a manner that assures an average representative of the sampling period. For the chemical constituents ~~metals~~ that have water quality based standards dependent upon hardness, the chronic water quality standard will be calculated according to subsection (e) using the hardness of the water body at the time the ~~metals~~ sample was collected. To calculate attainment status of chronic ~~metals~~ standards, the concentration of the chemical constituent ~~metal~~ in each sample is divided by the calculated water quality standard for the sample to determine a quotient. The water quality standard is attained if the mean of the sample quotients is less than or equal to one for the duration of the averaging period.

c) The human health standard (HHS) for the chemical constituents listed in subsection (f) shall not be exceeded when the stream flow is at or above the harmonic mean flow pursuant to Section 302.658 nor shall an annual average, based on at least eight samples, collected in a manner representative of the sampling period, exceed the HHS except for those waters in which the Agency has approved a mixing zone or allowed mixing pursuant to Section 302.102~~as provided in subsection (d)~~.

d) The standard for the chemical constituents of subsections (g) and (h) shall not be exceeded at any time except for those waters in which the Agency has approved a mixing zone or allowed mixing pursuant to Section 302.102. ~~In waters where mixing is allowed pursuant to Section 302.102, the following apply:~~

~~1) The AS shall not be exceeded in any waters except for those waters for which the Agency has approved a zone of initial dilutions (ZID) pursuant to Section 302.102.~~

~~2) The CS shall not be exceeded outside of waters in which mixing is allowed pursuant to Section 302.102.~~

~~3) The HHS shall not be exceeded outside of waters in which mixing is allowed pursuant to Section 302.102.~~

e) Numeric Water Quality Standards for the Protection of Aquatic Organisms

Constituent	~~STORET Number~~	AS (μg/L)	CS (μg/L)
***			
Boron (total)		40,100	7,600

***

Cyanide (Weak acid dissociable or available)	~~00718~~	22	5.2
Fluoride (total)		$e^{A+B\ln(H)}$ where $A = 6.7319$ and $B = 0.5394$	$e^{A+B\ln(H)}$, but shall not exceed 4.0 mg/L where $A = 6.0445$ and $B = 0.5394$

***

Manganese (dissolved)		$e^{A+B\ln(H)}$ X 0.9812* where $A = 4.9187$ and $B = 0.7467$	$e^{A+B\ln(H)}$ X 0.9812* where $A = 4.0635$ and $B = 0.7467$

***

Zinc (dissolved)	~~01090~~	$e^{A+B\ln(H)}$ X 0.978*, where $A = 0.9035$ and $B = 0.8473$	$e^{A+B\ln(H)}$ X 0.986*, where ~~$A = -0.8165$~~ $A = -0.4456$ and $B = 0.8473$

***

where: $\mu g/L$ = micrograms per liter
e^x = base of natural logarithms raised to the x- power
$\ln(H)$ = natural logarithm of Hardness ~~(STORET 00900)~~
* = conversion factor multiplier for dissolved metals

f) Numeric Water Quality Standard for the Protection of Human Health

Constituent	~~STORET Number~~	($\mu g/L$)
Mercury (total)	~~71900~~	0.012

****

g) Single-value standards apply at the following concentrations for these substances: ~~Concentrations of the following chemical constituents shall not be exceeded except in waters for which mixing is allowed pursuant to Section 302.102.~~

Constituent	Unit	~~STORET Number~~	Standard
Barium (total)	mg/L	~~01007~~	5.0
~~Boron (total)~~	~~mg/L~~	~~01022~~	~~1.0~~
Chloride (total)	mg/L	~~00940~~	500
~~Fluoride~~	~~mg/L~~	~~00951~~	~~1.4~~
Iron (dissolved)	mg/L	~~01046~~	1.0
~~Manganese (total)~~	~~mg/L~~	~~01055~~	~~1.0~~

***

where: mg/L = milligrams per liter and
μg/L = micrograms per liter

h) Water quality standards for sulfate are as follows: ~~The following concentrations for sulfate must not be exceeded except in receiving waters for which mixing is allowed pursuant to Section 302.102:~~

***

***

As explained above, the Agency is proposing to amend the language in Subsection 302.208(a), (b) and (c) to include the language from existing subsection 302.208(d) that addresses how each type of standard is applied. Subsection (d) is replaced with language from subsections (g) and (h) describing how the single-value standards are applied. This change is intended to assist the reader in understanding how each type of standard (acute, chronic, human health and single-value) will be applied.

Also in Section 302.208, the Agency is proposing to delete references to STORET numbers and to change the term "metal" to "chemical constituent" in subsection (b) for accuracy and for consistency with the other subsections. The Agency is proposing to add an "s" to milligram and microgram in the equation keys in subsections (e) and (g) and adding "of" between base and natural in the key in subsection (e). In subsection (e) the phrase "(Weak acid

dissociable or available)" to the table after cyanide and "(total)" is added to mercury in subsection (f).

The Agency's proposal in Section 302.208 also corrects the error to the derivation of the chronic zinc water quality standard that was explained above. This correction of the error in the existing formula for the General Use chronic water quality standard for zinc results in a change in the equation in the Table in Section 302.208(e) from A = -0.8165 to A = -0.4456.

Finally, the outdated boron, fluoride and manganese standards are deleted from subsection (g) and the new proposed standards are added to subsection (e).

SUBPART C: PUBLIC AND FOOD PROCESSING WATER SUPPLY STANDARDS

The following amendments (in addition to the deletion of all STORET numbers in the Table) are proposed for 35 Ill. Adm. Code Part 302, Subpart C, Sections 302.303 and 302.304:

Section 302.303 Finished Water Standards

Water shall be of such quality that with treatment consisting of coagulation, sedimentation, filtration, storage and chlorination, or other equivalent treatment processes, the treated water shall meet in all respects the requirements of Part 611~~604~~.
(Note: Prior to codification, Table I, Rule 304 of Ch 6: Public Water Supplies.)

Section 302.304 Chemical Constituents

The following levels of chemical constituents shall not be exceeded:

CONSTITUENT	~~STORET NUMBER~~	CONCENTRATION (mg/l)
***		
Boron (total)		1.0
***		
Chloride (total)	~~00940~~	~~250.~~
***		1.4
Fluoride (total)		
***		
Manganese (total)	~~01055~~	1.0~~0.15~~

Nitrate-Nitrogen	~~00620~~	10~~.~~
***		
Sulfates	~~00945~~	250~~.~~
Total Dissolved Solids	~~70300~~	500~~.~~

In Section 303.303 the Agency is deleting a cross-reference to Part 604, which has been repealed, and replacing it with the appropriate cross-reference to the drinking water standards in Part 611. In Section 303.304, the Agency is proposing to delete all STORET numbers (even those not repeated above) and a handful of misplaced periods or decimal points. The term "(total)" is added after chloride in the table and the current General Use water quality standards for boron and fluoride are moved to this Section applicable at Public Water Supply intakes. The amended Public and Food Processing Water Supply standard for manganese of 1 mg/liter is also included.

SUBPART E: LAKE MICHIGAN BASIN WATER QUALITY STANDARDS

The proposed changes to Subpart E are being made to 35 Ill. Adm. Code 302.504, 302.553 and 302.595. In addition to the deletion of all STORET numbers from the Tables, in Section 302.504 the Agency proposal contains the following language:

Section 302.504 Chemical Constituents

The following concentrations of chemical constituents must not be exceeded, except as provided in Sections 302.102 and 302.530:

a) The following standards must be met in all waters of the Lake Michigan Basin. Acute aquatic life standards (AS) must not be exceeded at any time except for those waters for which the Agency has approved a zone of initial dilution (ZID) pursuant to Sections 302.102 and 302.530. Chronic aquatic life standards (CS) and human health standards (HHS) must not be exceeded outside of waters in which mixing is allowed pursuant to Section 302.102 and 302.530 by the arithmetic average of at least four consecutive samples collected over a period of at least four days. The samples used to demonstrate compliance with the CS or HHS must be collected in a manner which assures an average representation of the sampling period.

Constituent	~~STORET Number~~	Unit	AS	CS	HHS
***					
Boron (total)		mg/L	40.1	7.6	NA
***					
Cyanide (Weak acid dissociable or available)	~~00718~~	µg/L	22	5.2	NA
Fluoride (total)		µg/L	exp[A +Bln(H)] where A = 6.7319 and B = 0.5394	exp[A +Bln(H)], but shall not exceed 4.0 mg/L where A = 6.0445 and B = 0.5394	NA
***					
Manganese (dissolved)		µg/L	exp[A +Bln(H)] X 0.9812* where A = 4.9187 and B = 0.7467	exp[A +Bln(H)] X 0.9812* where A = 4.0635 and B = 0.7467	NA
***					
Toluene	~~78131~~	µg/L~~mg/L~~	2000	610	51.0
***					

Where:

NA = Not Applied
Exp[x] = base of natural logarithms raised to the x-power

ln(H) = natural logarithm of Hardness
~~(STORET 00900)~~
* = conversion factor multiplier for dissolved metals

b) The following water quality standards must not be exceeded at any time in any waters of the Lake Michigan Basin, unless a different standard is specified under subsection (c) of this Section.

Constituent	~~STORET Number~~	Unit	Water Quality Standard
***			
~~Boron (total)~~	~~01022~~	~~mg/L~~	~~1.0~~
***			
~~Fluoride~~	~~00951~~	~~mg/L~~	~~1.4~~
***			
~~Manganese (total)~~	~~01055~~	~~mg/L~~	~~1.0~~
***			

c) In addition to the standards specified in subsections (a) and (b) of this Section, the following standards must not be exceeded at any time in the Open Waters of Lake Michigan as defined in Section 302.501.

Constituent	~~STORET Number~~	Unit	Water Quality Standard
***			
Boron (total)		mg/L	1.0
***			
Chloride (total)	~~00940~~	mg/L	12.0
Fluoride (total)		mg/L	1.4
***			
Manganese (total)	~~01055~~	mg/L	0.15
***			

d) In addition to the standards specified in subsections (a), (b) and (c) of this Section, the following human health standards (HHS) must not be exceeded in the Open Waters of Lake Michigan as defined in Section 302.501 by the arithmetic average of at least four consecutive samples collected over a period of at least four days. The samples used to demonstrate compliance with the HHS must be collected in a manner which assures an average representation of the sampling period.

Constituent	~~STORET Number~~	Unit	Water Quality Standard
***			
~~Toluene~~	~~78131~~	~~mg/L~~	~~5.60~~
***			

The Agency has proposed elimination of STORET numbers throughout this Section. Subsection (a) contains the new boron, fluoride and manganese water quality standards which are in line with those proposed for General Use waters. The phrase "or available" is added after "weak acid dissociable" following the cyanide standard in subsection (a). An error in the toluene units is corrected from milligrams to micrograms in subsection (a). The outdated boron, fluoride and manganese standards are deleted from subsections (b), while the same standards for boron and fluoride are added to the Open Waters of Lake Michigan language in subsection (c). The term "(total)" is added after "chloride" in subsection (c). Finally, the duplicative and unnecessary toluene standard is deleted from subsection (d). No changes are proposed to subsection (e).

The following amendments are proposed for Section 302.553(d) and 302.595(a):

Section 302.553 Determining the Lake Michigan Aquatic Toxicity Criteria or Values - General Procedures

The Lake Michigan Aquatic Life Criteria and Values are those concentrations or levels of a substance at which aquatic life is protected from adverse effects resulting from short or long term exposure in water.

****

d) If data for acute effects are not available for all the eight families listed above, but are available for the family Daphnidae, a Tier II value shall be derived according to procedures in Section 302.563. If data for chronic effects are not available for all the eight families, but there are acute and chronic data available according to Section 302.565(b) so that three acute to chronic ratios (ACRs) can

be calculated, then a Tier I chronic criterion can be derived according to procedures in Section 302.565. If three ACRs are not available, then a Tier II chronic value can be derived according to procedures in Section 302.565(be).

The cross-reference to Section 302.565(e) found in Section 302.553(d) is incorrect, because that subsection does not exist in the Board's rules. It is being replaced with the correct cross-reference to Section 302.565(b).

Section 302.595 Listing of Bioaccumulative Chemicals of Concern, Derived Criteria and Values

a) The Agency shall maintain a listing of toxicity criteria and values derived pursuant to this Subpart. This list shall be made available to the public and updated periodically but no less frequently than quarterly, and when updated shall be published on the Agency's website ~~when updated in the Illinois Register~~.

****

The amendment to this subsection is designed to replace the duplicative effort of making the list of derived water quality criteria available on both the Illinois EPA website and in the Illinois Register as discussed above.

SUBPART F: PROCEDURES FOR DETERMINING WATER QUALITY CRITERIA

In Subpart F of Part 302, the Agency is proposing changes to Sections 302.648, 302.657 and 302.669. The following changes are proposed to Section 302.648 and 302.657:

Section 302.648 Determining the Human Threshold Criterion

The HTC is calculated according to the equation:

***

W = Per capita daily water consumption equal to 2 liters per day (L/d) for surface waters at the point of intake of a public or food processing water supply, or equal to 0.01 liters per day (L/d) which represents incidental exposure through contact or ingestion of small volumes of water while swimming or during other recreational activities for areas which are determined to be public

access areas pursuant to Section 302.102~~302.201~~(b)(3), or 0.001 liters per day (L/d) for other General Use waters;

***

Section 302.657 Determining the Human Nonthreshold Criterion

The HNC is calculated according to the equation:

***

W = Per capita daily water consumption equal to 2 liters per day (L/d) for surface waters at the point of intake of a public or food processing water supply, or equal to 0.01 liters per day (L/d) which represents incidental exposure through contact or ingestion of small volumes of water while swimming or during other recreational activities for areas which are determined to be public access areas pursuant to Section 302.102~~302.201~~(b)(3), or 0.001 liters per day (L/d) for other General Use waters;

***

Both of these Sections contain a cross-reference to Section 302.201(b)(3). That referenced provision does not exist and is being amended to the reference the correct and existing Section 302.102(b)(3). This was likely simply a typographical error in the existing rules.

The following language is proposed for Section 302.669:

Section 302.669 Listing of Derived Criteria

a) The Agency shall develop and maintain a listing of toxicity criteria pursuant to this Subpart. This list shall be made available to the public and updated periodically but no less frequently than quarterly, and when updated shall be published on the Agency's website ~~when updated in the Illinois Register~~.

The Agency is proposing one final amendment to Part 302, which is to eliminate the requirement in Section 302.669 to publish derived criteria quarterly in the Illinois Register and to instead publish quarterly updates on the Illinois EPA website.

PART 303, SUBPART C: SPECIFIC USE DESIGNATIONS AND SITE SPECIFIC WATER QUALITY STANDARDS

The Agency is also proposing one change at this time to 35 Ill. Adm. Code Part 303. This change is a repeal of Section 303.312:

Section 303.312 Waters Receiving Fluorspar Mine Drainage (Repealed)

~~a) The fluoride standard of Section 302.208 shall not apply to waters which:~~

~~1) receive effluent from the mines and mills of the fluorspar mining and concentrating industry, and~~

~~2) have been designated by the Illinois State Water Survey as streams which once in ten years have an average minimum seven day low flow of zero.~~

~~b) Such waters shall meet the following standard with regard to fluoride:~~

~~CONSTITUENT~~	~~STORET NUMBER~~	~~CONCENTRATION mg/l~~
~~Fluoride~~	~~00950~~	~~5~~

This provision provided site-specific relief from the fluoride standard to two companies: Ozark-Mahoning and Minerva Oil who performed Fluorspar mining in Pope and Hardin Counties in southern Illinois. *See*, In the Matter of: Proposed Amendments to Rules 203 and 408 of the Illinois Water Pollution Control Regulations, R73-15 (March 6, 1975) (Attachment 4). The receiving streams impacted by discharges from these two companies are outlined in pages 3 and 4 of the Board's March 6, 1975 Opinion and Order. Both companies have ceased production and terminated their discharge permits. In fact, according to the Illinois State Geologic Survey there are currently no companies conducting fluorspar in Illinois or anywhere in the United States. *See*, Attachment 5. If fluorspar mining were to resume in Illinois, it is likely that such activity could comply with the new, less stringent, General Use fluoride water quality standards. If additional relief would be necessary, the Agency believes that the affected party should justify such future relief to the Board under the current science and the new, updated fluoride water quality standards.

IV. FACTS IN SUPPORT

The proposal before the Board relies on the technical support document prepared by Bureau of Water staff at the Illinois EPA and a variety of studies and papers cited in that report. The facts in support of this proposal are outlined in detail in Attachment 1. In particular, the Agency relied extensively on the results of tests conducted by Dr. Soucek of the Illinois Natural History Survey. Dr. Soucek's Report of the studies conducted is included this rulemaking submittal as Exhibit U to Attachment 1. The documents relied on and methods for obtaining underlying data are explained below and a comprehensive list of Exhibits and documents relied upon in developing this rulemaking proposal is provided at the end of this Statement of Reasons.

V. TECHNICAL FEASIBILITY AND ECONOMIC JUSTIFICATION

Section 27 of the Act requires the Board to consider the technical feasibility and economic reasonableness of all rulemaking proposals.

A. Technical Feasibility

Illinois EPA has investigated the treatment options for boron and fluoride as a result of the Agency's obligation to provide recommendations to the Board in response to petitions for site specific regulatory relief from these water quality standards. Both substances are highly soluble and this characteristic generally confounds attempts at treatment. Boron does not respond to the usual method of treating metals by raising pH and precipitating the metal to sludge. Fluoride likewise does not respond to this manner of treatment. The only methods of treatment identified have been reverse osmosis, which is seldom acceptable as it results in a high concentration wastewater that still must be disposed of, and various non-conventional treatment processes that are very expensive and have not seen routine use. In every case for site-specific water quality standards or adjusted standards brought before the Board, Illinois EPA has

concluded that no reasonable treatment exists for boron and fluoride to reduce effluent concentrations. *See*, Attachment 1, Exhibit D.

Unlike boron and fluoride, manganese does respond to treatment by raising pH and thereby forcing precipitation. A chemical is added to a basin which raises effluent pH causing manganese to precipitate. The proposed change in the manganese water quality standard may relieve future mine outfalls from manganese treatment, however, manganese permit limits may still be dictated by 35 Ill. Adm. Code Subtitle D: Mine Related Water Pollution. Other than some coal mines, the only facilities known to treat for manganese are public water supply treatment plants that remove manganese from surface water to meet drinking water standards and then must filter or settle suspended manganese particles from the wastewater. The Agency does believe this rulemaking will result in the need to implement additional treatment technologies beyond those required by the existing regulations.

B. Economic Justification

In addition to technical feasibility, the Board is required to examine the economic impacts of any new technology required by this rulemaking proposal. The Agency does not expect that any of these water quality standards changes will require any new technology upgrades to achieve compliance. Although the proposal makes a number of changes to the boron, fluoride, and manganese standards applicable to the Lake Michigan Basin, Public and Food Processing and General Use water quality standards, these standards should not become more stringent than the existing standards in any waters of the State of Illinois. The only water quality standard that could become more stringent than the existing standard is in General Use waters where the ambient hardness is less than 45 milligrams per liter which would result in a chronic manganese standard of less than 1 milligram per liter. The Agency is not aware of any

facilities that will be required to install upgrades to achieve compliance with this proposal. The only foreseeable exception to this will be if any of the facilities currently granted regulatory relief that is not moot as a result of this standard are unable to demonstrate that they can either meet the new standard or are no longer able to meet the standards for the grant of regulatory relief by the Board. As explained below, this is expected to be a small group of sources and the Agency hopes these sources will come forward and address their concerns as part of the rulemaking proceeding. For these reasons, the Agency's proposed changes are clearly technically feasible and economically reasonable.

VI. AFFECTED FACILITIES AND OUTREACH

A. Affected Facilities

This rulemaking proposal would establish revised ambient water quality standards and does not seek to establish any specific effluent standards or other requirements targeted at specific facilities or classes of facilities. However, if a discharger in the State of Illinois has permit limits driven by water quality standards rather than or in addition to technology based limits, they could potentially be affected by one or more of the various standards being proposed.

In the case of dischargers who are currently in compliance with the existing water quality standards for boron, fluoride and manganese, there should be no impact. Illinois EPA expects that for those facilities, the applicable water quality standard is either staying the same or becoming less stringent, so there will be no impact. The only classes of facilities the Agency considers to be potentially impacted negatively by this proposal are those facilities with existing regulatory relief from the current standard or facilities that discharge to receiving waters with less than 45 mg/L hardness and have a reasonable potential to discharge greater than 1.0 milligrams per liter of manganese as a long term average. As further detailed on page 19 of

Attachment 1, critical hardness concentrations in Illinois waters are rarely less than 90 milligrams per liter and no ambient water quality monitoring network stations are known to possess a critical hardness of less than 45 milligrams per liter. *See also*, Attachment 1, Exhibit S.

A complete list of potentially affected facilities with existing regulatory relief from the current water quality standards is provided as Exhibit D to Attachment 1. This list of affected facilities and stream segments includes four facilities with fluoride relief and eight facilities with boron relief. There is also currently a site-specific rule that sets a water quality standard of 5 mg/L in waters receiving discharges from fluorspar mining activities in 303.312. That relief was originally adopted to impact two companies - Ozark-Mahoning and Minerva Oil. *See*, R73-15 (March 6, 1975). Since there is no longer any fluorspar mining in the United States and since this relief was granted thirty-five years ago, the Agency is proposing to repeal that provision at this time.

In the Board Opinion in *In the Matter of: City of Galva Site Specific Water Quality Standard for Boron Discharges to Edwards River and Mud Run Creek: 35 Ill. Adm. Code 303.447 and 303.448* the Board found:

> The Board notes that the record indicates the Agency is cooperating with the Illinois Natural History Survey (INHS) to generate additional boron toxicity studies to supplement the current database. Such data would help to ensure that boron general use standards proposed in the future would be protective of aquatic life. The results of the Agency/INHS study is expected to bolster the scientific justification for the revision of the general use boron water quality standard. If the Agency/INHS study results in new boron toxicity information that raises any concerns with the site specific standards or renders such standards as moot, the Board expects the Agency to address those concerns as part of its proposal to revise the general use standards. The Board notes that in the past, the Board has revised existing site specific rules to make them consistent with the adopted revisions to the rule of general applicability. See Proposed New and Updated Rules for Measurement and Numerical Sound Emissions Standards Amendments to 35 Ill. Adm. Code 901 and 910, (R03-9) March 2, 2006.

See, R09-11 (August 6, 2009). *See also, In the Matter of: Proposed Site Specific Rule for City of Springfield, Illinois, Office of Public Utilities, City, Water, Light and Power and Springfield Metro Sanitary District from 35 Ill. Adm. Code 302.208(g): New 35 Ill. Adm. Code 303.446*, R09-8 (May 21, 2009).

Of the facilities with fluoride regulatory relief granted by the Board, there are none that have relief that would exceed the proposed acute standard. However, the Agency also had to consider whether any of the affected facilities would exceed the proposed chronic standard.

The relief granted to Granite City Steel in *In the Matter of: Granite City Division of National Steel Petition for Adjusted Standard from 35 Ill. Adm. Code 302.208: Numeric Standard for Fluoride*, AS 90-4 (April 8, 1993) should become moot because the chronic fluoride standard will be the same as the never to be exceeded standard granted in Horseshoe Lake. Based information contained in Discharge Monitoring Reports, it appears that the fluoride relief granted to Modine Manufacturing in *In the Matter of: Site-Specific Limitation for the Modine Manufacturing Company Facility, Ringwood, Illinois*, R87-36 (May 24, 1990) and to the City of Effingham in *In the Matter of Site Specific Rule for City of Effingham Treatment Plant Fluoride Discharge, 35 Ill. Adm. Code 304.233*, R03-11 (December 18, 2003) should no longer be necessary.[1] For Modine Manufacturing, the company's Discharge Monitoring Reports show that the facility no longer has elevated fluoride levels in its discharge, so the relief granted by the Board in R87-36 may no longer be necessary. For the City of Effingham, the Discharge Monitoring Reports show that the highest fluoride value reported since July of 2005 is 4.0 mg/L.

[1] The fluoride relief granted to the City of Effingham required compliance with a 2.0 mg/L water quality standard at the City of Flora's public water supply intake. That relief, as written, would have caused the Agency's proposed Public and Food Processing Water Supply standard to be exceeded. However, since the Board opinion was issued in R03-11, the City of Flora has connected to the Gateway Regional Water Supply System and no longer has a surface water intake in the Little Wabash River so compliance with the proposed new Public and Food Processing Water Supply fluoride water quality standard of 1.4 mg/L will not be a problem.

Based on this information, it appears that Effingham would not need regulatory relief in order to comply with the proposed chronic fluoride standard of 4.0 mg/L as a monthly average.

General Motors is the only facility granted regulatory relief by the Board from the fluoride water quality standard that the Agency has identified will still need the Board relief upon adoption of the Agency's fluoride proposal. *See, In the Matter of: Petition of General Motors Corporation to Amend 35 Ill. Adm. Code 303.222* (Site Specific Regulation for Fluoride), R93-13 (January 11, 1995) and Attachment 1, Exhibit D.

For the site-specific regulatory relief from the boron water quality standards, none of the dischargers would cause an exceedance of the proposed acute boron standard of 40.1 mg/L. As with fluoride, the Agency investigated whether the chronic standard of 7.6 mg/L would be met in all cases.

The following three facilities have relief from the boron standard that will clearly become moot upon adoption of the Agency's proposal: City of Galva (Northeast STP)(*In the Matter of: City of Galva Site Specific Water Quality Standard for Boron Discharges to Edwards River and Mud Run Creek: 35 Ill. Adm. Code 303.447 and 303.448*, R09-11 (August 6, 2009)), Akzo Nobel (*In the Matter of: Petition of Akzo Chemicals, Inc. for an Adjusted Standard from 35 Ill. Adm. Code 304.105 and 302.208*, AS93-8 (September 1, 1994)) and CILCO (Duck Creek)(*In the Matter of: Petition of Central Illinois Light Company (Duck Creek Station) for Adjusted Standard from 35 Ill. Adm. Code 302.208 and 35 Ill. Adm. Code 304.105 Regarding the Parameter Boron*, AS96-8 (June 20, 1996)). These standards will become moot because the never-to-be-exceeded relief granted by the Board in these proceedings is lower than the new chronic standards proposed by the Agency.

Review of the relief granted and the Discharge Monitoring Reports and discussions with interested parties has led the Agency to conclude that the chronic standard will be consistently met and therefore the boron relief granted by the Board should no longer be needed for four of the remaining five facilities. These facilities are City of Springfield, Spring Creek STP; Dynegy Baldwin Station (Illinois Power); Southern Illinois Power Cooperative (SIPC); and Dynegy Midwest Generation – Wood River Station (Illinois Power). *See, In the Matter of: Proposed Site Specific Rule for City of Springfield, Illinois, Office of Public Utilities, City, Water, Light and Power and Springfield Metro Sanitary District from 35 Ill. Adm. Code 302.208(g): New 35 Ill. Adm.Code 303.446*, R09-8 (May 21, 2009); *In the Matter of: Petition of Illinois Power Company (Baldwin Power Plant) for Adjusted Standard from 35 Ill. Adm. Code 302.208 and 35 Ill. Adm. Code 304.105 Regarding the Parameter Boron*, AS96-1 (Mary 2, 1996); *In the Matter of: Petition of South Illinois Power Cooperative (Marion Power) for Adjusted Standard from 35 Ill. Adm. Code 302.208(e),* AS92-10 (July 1, 1993); and *In the Matter of: The Proposed Amendment to Rule 203 of the Water Pollution Regulations* (R76-18)(May 25, 1978). While there was initially a potential that relief granted to these facilities could have resulted in exceedance of the chronic boron water quality standard in one of the impacted stream segments, further investigation revealed that Board relief from the new chronic standard would no longer be necessary for these facilities.

Based on the Agency's initial investigations, it appears that the boron relief granted by the Board will still be necessary for at least one of the identified segments for one of the affected facilities. This facility is Springfield City Water Light and Power and the impacted segment is Sugar Creek from Spaulding Dam to Sewage Treatment Plant only. See, *In the Matter of:*

Petition of the City of Springfield, Office of Public Utilities for an Adjusted Standard from 35 Ill. Adm. Code 302.208(e), AS94-9 (December 1, 1994).

In addition, there are several classes of facilities that have the potential to benefit from this proposal. Dischargers to streams with Public and Food Processing Water Supply intakes may benefit from removal of some streams from the 303(d) List for manganese. It is also possible that coal mines and other industrial or municipal dischargers with water quality based effluent limits may benefit from the new General Use standards for boron, fluoride and manganese. With regard to the proposed correction to the zinc water quality standard, it is possible that correction of this error will benefit some facilities that are currently having difficulty meeting their permit limits. The Agency has identified all facilities in the State with permit limits for zinc and has included that list of potentially impacted facilities at Attachment 7 to this Statement of Reasons.

B. Outreach

Illinois EPA shared a draft rulemaking proposal with approximately 120 stakeholders on September 17, 2009. These stakeholders included representatives of state and federal government agencies, universities, environmental groups, industrial dischargers, municipal dischargers, trade associations and consulting engineers.

A meeting was held on October 19, 2009 at the Illinois EPA Headquarters in Springfield to explain the draft proposal and respond to any questions or comments. Approximately 25 stakeholder representatives attended. The Agency made presentations on the different components of the draft proposal and answered questions on the presentations. The Agency also distributed copies of the various presentations following the meeting. The Agenda and Sign In

list from the stakeholder meeting are included as Attachments 2 and 3 to this Statement of Reasons.

The Agency accepted written comments from the stakeholders following the meeting. Comments were received from the Springfield Metropolitan Sanitary District and the Illinois Environmental Regulatory Group.

Follow-up emails were sent to the stakeholders on July 8, 2010 and November 10, 2010. These emails updated the stakeholders on changes to the proposal as a result of additional tests and information becoming available and the Agency's progress and timeline towards filing this proposal with the Board.

VII. SYNOPSIS OF TESTIMONY

Pre-filed Testimony will be submitted by two Illinois EPA witnesses, Bob Mosher and Brian Koch.

A. Bob Mosher, Manager, Water Quality Standards Unit, Division of Water Pollution Control, Bureau of Water, Illinois EPA

Mr. Mosher will present testimony on the background and history of the current General Use, Lake Michigan Basin and Public and Food Processing Water Supply water quality standards for boron, fluoride and manganese. He will also present testimony on the proposed change to the derived water quality criteria publication provision and the additional non-substantive updates to the regulatory language in Part 302. Mr. Mosher will also be available to answer general questions on the water quality standards program and the triennial review process.

B. Brian Koch, Environmental Protection Specialist, Water Quality Standards Unit, Division of Water Pollution Control, Bureau of Water, Illinois EPA

Mr. Koch will present technical testimony regarding the development of the proposed changes to the boron, fluoride and manganese General Use, Lake Michigan Basin and Public and Food Processing Water Supply water quality standards. He will testify about the literature surveyed and new toxicity tests performed in support of this water quality standard proposal to the Board. He will be available to answer technical questions regarding the toxicity of boron, fluoride and manganese to aquatic life and the water quality standard derivation process for these parameters. Mr. Koch will also explain and answer questions related to the error discovered by the Agency in the derivation of the zinc water quality standard and the correction of that error in this proceeding.

C. Testimony in Support of the Agency's proposal

At this time, Mr. Mosher and Mr. Koch are the only anticipated witnesses in support of this rulemaking proposal that Illinois EPA intends to call to provide testimony. Both witnesses are expected to submit Pre-filed Testimony to the Board as directed by the Hearing Officer. The Agency also reserves the right to submit testimony from additional witnesses if necessary to address any questions or concerns raised by the public or the Board with respect to this proposal and to have additional Agency staff present at the Board hearings on this proposal to answer unforeseen questions that may arise.

VIII. SUPPORTING DOCUMENTATION

A. Statement Regarding Compliance with 5 ILCS 100/5-40(3.5)

Pursuant to the Illinois Administrative Procedure Act, the Board's procedural rules provide that rulemaking proponents must submit to the Board "*A descriptive title or other description of any published study or research report used in developing the rule, the identity of the person who performed such study, and a description of where the public may obtain a copy*

of any such study or research report. If the study was performed by an agency or by a person or entity that contracted with the agency for the performance of the study, the agency shall also make copies of the underlying data available to members of the public upon request if the data are not protected from disclosure under the Freedom of Information Act [5ILCS 140]. [5 ILCS 100/5-40(3.5)]." 35 Ill. Adm. Code 102.202(e).

To assist the Board in compliance with these requirements, the Agency has attempted to file as Attachments to this proposal the bulk of the information relied on in developing this proposal to the Board. See Section B below for the List of Attachments that provides the relevant identifying information for these Attachments. In addition, the Agency has provided a second list in Section C below of documents relied upon, but not submitted to the Board as Attachments to this rulemaking proposal. Many of these documents are U.S. EPA guidance documents and Board opinions that are readily accessible by the Board and the public.

With regard to studies conducted by the Agency or by an entity that contracted with the Agency for performance of the study, the Agency has provided summaries of the underlying data from those studies as Attachments to the Statement of Reasons and Technical Support Document. To the extent that the Agency relied on studies with voluminous amounts of raw data or documents that are subject to copyright protection, the Agency will make such underlying data and supporting documents available to members of the public at the Illinois EPA Library which is located at the Agency Headquarters at the following address:

Illinois Environmental Protection Agency
1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276

The studies relied on in developing these proposals which are summarized, but not attached are identified both in the list of references in Attachment 1 and in Subsection C below.

B. List of Attachments

Attachment 1 – Facts in Support of Changing Water Quality Standards for Boron, Fluoride, and Manganese (Illinois EPA, Bureau of Water, 2010)

Exhibit A – Water Quality Criteria (Boron), McKee and Wolf (1963)
Exhibit B – Water Quality Criteria (Fluoride) McKee and Wolf (1963)
Exhibit C – Water Quality Criteria (Manganese) McKee and Wolf (1963)
Exhibit D – Site-specific relief granted by the IPCB for boron and fluoride to date
Exhibit E – Manganese removal estimations at conventional utilities located on impaired Public and Food Processing water Supply waters with Mn exceeding 150 ug/L
Exhibit F – Guidelines for deriving numerical National Water Quality Criteria for the protection of aquatic organisms and their uses
Exhibit G – Acute Toxicity Data used in Boron Standard Derivation
Exhibit H – Chronic Toxicity in Boron Standard Derivation
Exhibit I – Boron Standard Derivation using 1985 Guidelines Methodology
Exhibit J – Influence of hardness and pH on boron toxicity
Exhibit K – Fluoride Standard Derivation Using 1985 Guidelines Methodology
Exhibit L – Manganese Standard Derivation Using 1985 Guidelines Methodology
Exhibit M – Acute and chronic fluoride standards at variable hardness using 1985 Guidelines Methodology
Exhibit N – Acute and chronic manganese standards at variable hardness using 1985 Guidelines Methodology
Exhibit O – Acute toxicity data used in fluoride Standard Derivation
Exhibit P – Chronic toxicity data used in fluoride Standard Derivation
Exhibit Q – Acute toxicity used in manganese Standards Derivation
Exhibit R – Chronic toxicity data used in manganese Standard Derivation
Exhibit S – Ambient Water Quality Monitoring Network (AWQMN)
Exhibit T – Calculation of the conversion factor multiplier for manganese standards derived from total and dissolved manganese data collected during the chronic *Hyalella azteca* test. For each treatment, the filtered (dissolved) results were divided by the unfiltered (total) results to calculate the percent of dissolved manganese
Exhibit U – Final Report, Acute and Chronic Toxicity of Boron, Fluoride, and Manganese to Freshwater Organisms, by David J. Soucek and Amy Dickinson, Illinois Natural History Survey, University of Illinois, October 14, 2010
Exhibit V – Excerpts from Exhibit S to Agency Rulemaking Proposal in R02-11
Exhibit W – Accumulation, regulation and toxicity of copper, zinc, lead and mercury in *Hyalella azteca*, U. Borgmann, W.P. Norwood & C. Clarke, *Hydrobiologia*, 259: 79 – 89 (1993)
Exhibit X: Revised chronic zinc standard using the corrected *Hyalella azteca* MATC

Attachment 2 – Water Quality Standards Stakeholders Meeting Agenda, dated October 19, 2009

Attachment 3 – Water Quality Standards Stakeholders Meeting Sign in list, dated October 19, 2009

Attachment 4 – Opinion and Order of the Illinois Pollution Control Board, In the Matter of: Proposed Amendments to Rules 203 and 408 of the Illinois Water Pollution Control Regulations, R73-15 (March 6, 1975)

Attachment 5 – Information from the Illinois State Geological Survey

Attachment 6 – Great Lakes Environmental Commission Final Report (October 22, 2010) (excerpts pertaining to boron, manganese and fluoride tests only)

Attachment 7 – Facilities with NPDES Permit Limits Based on the Incorrect Chronic Standard for Zinc

Attachment 8 – Agency Errata Sheets 1, 2 and 3 from R02-11

C. List of Documents Relied Upon But Not Attached

Guidance Documents

Method OIA-1677 Available Cyanide by Flow Injection, Ligand Exchange, and Amperometry, 821-R-99-013, United States Environmental Protection Agency (August, 1999).

Standard Methods for the Examination of Water and Wastewater: Centennial Edition. 21st Edition. Eaton, AD, LS Clesceri, EW Rice, AE Greenberg, and MAH Franson (editors). ISBN: 0875530478. American Public Health Association. 2005. Washington, D.C.

Pollution Control Board Opinions: Rulemakings of General Applicability

In the Matter of: Water Quality Triennial Review: Amendments to 35 Adm. Code 302.105, 302.208(e)-(g), 302.504(a), 302.575(d), 309.141(h); and Proposed 35 Ill. Adm. Code 301.267, 301.313, 301.413, 304.120, and 309.157, R02-11 (December 19, 2002).

In the Matter of: Conforming Amendments for the Great Lakes Initiative: 35 Ill. Adm. Code Part 302.101; 302.105; 302.Subpart E; 303.443, and 304.222, R97-25 (

In the Matter of: Proposed Amendments to Title 35, Subtitle C (Toxins Control), R88-21 – Docket A (January 25, 1990).

In the Matter of: Water Quality Standards Revisions, R71-14 (Consolidated with R70-8 and R71-20) (March 7, 1972).

Pollution Control Board Opinions: Site Specific Rulemakings and Adjusted Standards

Boron

In the Matter of: City of Galva Site Specific Water Quality Standard for Boron Discharges to Edwards River and Mud Run Creek: 35 Ill. Adm. Code 303.447 and 303.448, R09-11 (August 6, 2009).

In the Matter of: Proposed Site Specific Rule for City of Springfield, Illinois, Office of Public Utilities, City, Water, Light and Power and Springfield Metro Sanitary District from 35 Ill. Adm. Code 302.208(g): New 35 Ill. Adm. Code 303.446, R09-8 (May 21, 2009).

In the Matter of: Petition of Central Illinois Light Company (Duck Creek Station) for Adjusted Standard from 35 Ill. Adm. Code 302.208 and 35 Ill. Adm. Code 304.105 Regarding the Parameter Boron, AS96-8 (June 20, 1996).

In the Matter of: Petition of Illinois Power Company (Baldwin Power Plant) for Adjusted Standard from 35 Ill. Adm. Code 302.208 and 35 Ill. Adm. Code 304.105 Regarding the Parameter Boron, AS96-1 (May 2, 1996)).

In the Matter of: Petition of the City of Springfield, Office of Public Utilities for an Adjusted Standard from 35 Ill. Adm. Code 302.208(e), AS94-9 (December 1, 1994).

In the Matter of: Petition of Akzo Chemicals, Inc. for an Adjusted Standard from 35 Ill. Adm. Code 304.105 and 302.208, AS93-8 (September 1, 1994).

In the Matter of: Petition of South Illinois Power Cooperative (Marion Power) for Adjusted Standard from 35 Ill. Adm. Code 302.208(e), AS92-10 (July 1, 1993).

In the Matter of: The Proposed Amendment to Rule 203 of the Water Pollution Regulations, R76-18 (May 25, 1978)(Illinois Power Wood River Station).

Fluoride

In the Matter of: Granite City Division of National Steel Petition for Adjusted Standard from 35 Ill. Adm. Code 302.208: Numeric Standard for Fluoride, AS 90-4 (April 8, 1993).

In the Matter of: Petition of General Motors Corporation to Amend 35 Ill. Adm. Code 303.222 (Site Specific Regulation for Fluoride), R93-13 (January 11, 1995).

In the Matter of: Site-Specific Limitation for the Modine Manufacturing Company Facility, Ringwood, Illinois, R87-36 (May 24, 1990)

In the Matter of Site Specific Rule for City of Effingham Treatment Plant Fluoride Discharge, 35 Ill. Adm. Code 304.233, R03-11 (December 18, 2003).

Toxicity Studies and Data used in Derivation of Proposed Water Quality standards and summarized in Attachment 1, Exhibits G, H, O, P, Q and R:

Beleau, MH and JA Bartosz. 1982. Acute toxicity of selected chemicals: data base. U.S. Fish and Wildlife Service, Colorado River Fishery Project, Report No. 6. Salt Lake City, Utah. 3:242-254.

Biesinger, KE and GM Christensen. 1972. Effects of various metals on survival, growth, reproduction, and metabolism of *Daphnia magna*. Journal of the Fisheries Research Board of Canada 29:1691–1700.

Buikema, AL, CL See, and J Cairns, Jr. 1977. Rotifer sensitivity to combinations of inorganic water pollutants. OWRT Project A-071-VA. Virginia Water Resources Research Center Bulletin No. 92. Blackburg, VA; 42 p.

Calleja, MC, G Persoone, and P Geladi. 1994. Comparative acute toxicity of the first 50 multicentre evaluation of *in vitro* cytotoxicity chemicals to aquatic non-vertebrates. Archives of Environmental Contamination and Toxicology 26:69-78.

Camargo, JA and JV Tarazona. 1990. Acute toxicity to freshwater benthic macroinvertebrates of fluoride ion (F-) in soft water. Bulletin of Environmental Contamination and Toxicology 45:883-887.

Camargo, JA and JV Tarazona. 1991. Short-term toxicity of fluoride ion (F-) in soft water to rainbow trout (Salmo gairdneri) and brown trout (Salmo trutta fario). Fluoride 24(2):76-83.

Camargo, JA, JV Ward, and KL Martin. 1992. The relative sensitivity of competing hydropsychid species to fluoride toxicity in the Cache la Poudre River (Colorado). Archives of Environmental Contamination and Toxicology 22:107-113.

Couillard Y, P Ross, and B Pinel-Alloul. 1989. Acute toxicity of six metals to the rotifer *Brachionus calyciflorus*, with comparisons to other freshwater organisms. Toxicity Assessment 4:451-462.

Davies, PH and SF Brinkman. 1994. Acute and chronic toxicity of manganese to exposed and unexposed rainbow and brown trout. Federal Aid in Fish and Wildlife Restoration Job Progress Report, Colorado Division of Wildlife, Fish Research Section. Fort Collins, CO, USA. Federal Aid Project #F-243R-1.

Davies, PH and SF Brinkman. 1995. Acute and chronic toxicity of manganese to brown trout (*Salmo trutta*) in hard water. Federal Aid in Fish and Wildlife Restoration Job Progress Report, Colorado Division of Wildlife, Fish Research Section. Fort Collins, CO, USA. Federal Aid Project #F-243R-2.

Davies, PH, SF Brinkman, and M McIntyre. 1998a. Toxicity of manganese and zinc to Boreal toad tadpoles (*Bufo boreas*). In: Federal Aid in Fish and Wildlife Restoration Job Progress Final

Report, Colorado Division of Wildlife, Fish Research Section. Fort Collins, CO, USA. Federal Aid Project #F-243R-5.

Davies, PH, SF Brinkman, and M McIntyre. 1998b. Toxicity of manganese to early-life stage and fry of brook trout (*Salvelinus fontinalis*) and rainbow trout (*Oncorhynchus mykiss*) in water hardnesses of 30 and 150 mg/L. In: Federal Aid in Fish and Wildlife Restoration Job Progress Final Report, Colorado Division of Wildlife, Fish Research Section. Fort Collins, CO, USA. Federal Aid Project #F-243R-5.

Dethloff, GM, WA Stubblefield, and CE Schlekat. 2009. Effects of water quality parameters on boron toxicity to *Ceriodaphnia dubia*. Archives of Environmental Contamination and Toxicology 57:60-67.

ENSR. 1990. Unpublished in-house data.

ENSR. 1992a. Acute toxicity of manganese to *Pimephales promelas* under static-renewal test conditions at four levels of water hardness. June 1992.

ENSR. 1992b. Acute toxicity of manganese to *Ceriodaphnia dubia* under static-renewal test conditions at four levels of water hardness. June 1992.

ENSR. 1992c. Chronic toxicity of manganese to *Ceriodaphnia dubia* under static-renewal test conditions at four levels of water hardness. July 1992.

ENSR. 1996e. Early life stage toxicity of manganese to the fathead minnow (*Pimephales promelas*) under flow-through test conditions. March 1996.

Fieser, AH. 1985. Toxicity of fluorides to aquatic organisms: modeling for water hardness and temperature. Dissertation. University of Pittsburgh.

Gersich, FM. 1984. Evaluation of a static renewal chronic toxicity test method for *Daphnia magna* Straus using boric acid. Environmental Toxicology and Chemistry 3:89-94.

Great Lakes Environmental Center. October 22, 2010. Final Report on Acute and Chronic Toxicity of Nitrate, Nitrite, Boron, Manganese, Fluoride, Chloride and Sulfate to Several Aquatic Animal Species.

Hamilton, SJ. 1995. Hazard assessment of inorganics to three endangered fish in the Green River, Utah. Ecotoxicology and Environmental Safety 30:134-142.

Hamilton, SJ and KJ Buhl. 1990. Acute toxicity of boron, molybdenum and selenium to fry of chinook salmon and coho salmon. Archives of Environmental Contamination and Toxicology 19(6):366-373.

Hamilton, SJ and KJ Buhl. 1997. Hazard evaluation of inorganics, singly and in mixtures to Flannelmouth Sucker, *Catostomus latipinnis*, in the San Juan River, New Mexico. Ecotoxicology and Environmental Safety 38:296-308.

Harding ESE, Inc. 2001. Acute toxicity of strontium to *Oncorhynchus mykiss*, and manganese to *Physa integra*, under static test conditions. Laboratory Project ID: 311213.0100. September 2001.

Herbert, DWM and DS Shurben. 1964. The toxicity of fluoride to rainbow trout. Water and Waste Treatment. Sept/Oct 1964, pp. 141-142.

Hickey, CW. 1989. Sensitivity of four New Zealand cladoceran species and *Daphnia magna* to aquatic toxicants. New Zealand Journal of Marine and Freshwater Research 23:131-137.

Keller, AE and T Augspurger. 2005. Toxicity of fluoride to the endangered unionid mussel, *Alasmidonta raveneliana*, and surrogate species. Bulletin of Environmental Contamination and Toxicology 74:242-249.

Khangarot, BS. 1991. Toxicity of metals to a freshwater tubificid worm, *Tubifex tubifex* (Muller). Bulletin of Environmental Contamination and Toxicology. 46:906–912.

Lasier PJ, PV Winger, and KJ Bogenrieder. 2000. Toxicity of manganese to *Ceriodaphnia dubia* and *Hyalella azteca*. Archives of Environmental Contamination and Toxicology 38(3):298-304.

Lewis, M. 1978. Acute toxicity of copper, zinc, and manganese in single and mixed salt solutions to juvenile longfin dace, *Agosia chrysogaster*. Journal of Fish Biology 13:695-700.

Lewis, MA and LC Valentine. 1981. Acute and chronic toxicities of boric acid to *Daphnia magna* Straus. Bulletin of Environmental Contamination and Toxicology 27:309-315.

Maier, KJ and AW Knight. 1991. The toxicity of waterborne boron to *Daphnia magna* and *Chironomus decorus* and the effects of water hardness and sulfate on boron toxicity. Archives of Environmental Contamination and Toxicology 20:282-287.

Metcalfe-Smith, JL, KE Holtze, GR Sirota, JJ Reid, and SR De Solla. 2003. Toxicity of aqueous and sediment-associated fluoride to freshwater organisms. Environmental Toxicology and Chemistry 22:161-166.

Office of Pesticide Programs. 2000. Pesticide Ecotoxicity Database (Formerly: Environmental Effects Database (EEDB)). Environmental Fate and Effects Division, U.S. EPA, Washington, D.C.

Pimentel, R and RV Bulkley. 1983. Influence of Water Hardness on Fluoride Toxicity to Rainbow Trout. Environmental Toxicology and Chemistry 2(4):381-386.

Rathore, RS and BS Khangarot. 2003. Effects of water hardness and metal concentration on a freshwater *Tubifex tubifex* Muller. Water, Air, and Soil Pollution 142:341-356.

Reimer, PS. 1999. Environmental effects of manganese and proposed guidelines to protect freshwater life in British Columbia. Unpubl. Master's Thesis, Univ. British Columbia.

Sanders and Associates, LLC. 2007. Toxicity of boron to the aquatic organisms - *Hyalella azteca* (benthic crustacean), *Dugesia tigrina* (flatworm), *Ceriodaphnia dubia* (water flea) and *Pimephales promelas* (fathead minnow). Report to Michigan Department of Environmental Quality. April 30, 2007.

Sanders, D. 1998. Tier II boron value data supplement. Rept., RMT Applied Biology, Appleton, WI. August 7, 1998.

Sanders, D. 1999. Tier II boron value data supplement. Rept., RMT Applied Biology, Appleton, WI. February 15, 1999.

Smith, LR, TM Holsen, and NC Ibay. 1985. Studies on the acute toxicity of fluoride ion to stickleback, fathead minnow and rainbow trout. Chemosphere 14:1383-1389.

Soucek, DJ and A Dickinson. 2010. Acute and Chronic Toxicity of Boron, Fluoride, and Manganese to Freshwater Organisms. Illinois Natural History Survey, Institute of Natural Resource Sustainability. University of Illinois, Urbana-Champaign. Champaign, IL. Report to Illinois Environmental Protection Agency. October 5, 2010.

The Advent Group, Inc. 2000. Toxicity Test Results: Fluoride Water Quality Criteria. Prepared for U.S. Steel, Gary Works, by The Advent Group, Inc. Unpublished data.

Other Documents Relied On But Not Attached

Casale, RJ, MW LeChevallier, and FW Pontius. Review of Manganese Control and Related Manganese Issues. American Water Works Association (AWWA) Research Foundation and AWWA. Denver, CO, 2002.

East Fork LaMoine River Watershed TMDL Report. Illinois Environmental Protection Agency, IEPA/BOW/07-016. August, 2007.

Eckhert, CD. 1998. Boron stimulates embryonic trout growth. Journal of Nutrition 128:2488-2493.

Fort, DJ, TL Propst, EL Stover, FJ Murray, and PL Strong. 1999. Adverse effects from low dietary and environmental boron exposure on reproduction, development, and maturation in *Xenopus laevis*. The Journal of Trace Elements in Experimental Medicine 12:175-185.

Hamann, PE Jr., JB McEwen, and AG Meyers. 1990. Guide to Selection of Water Treatment Processes. In: Water Quality and Treatment: A Handbook of Community Water Supplies. 4th Edition. American Water Works Association, McGraw-Hill, USA, pp 157-187.

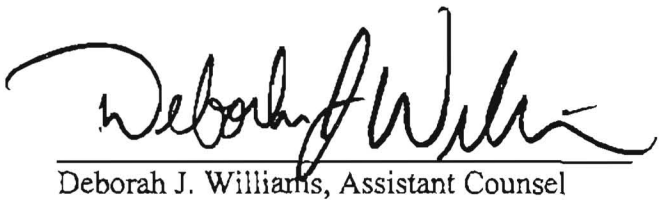
Kohl, PM, and SJ Medlar. Occurrence of Manganese in Drinking Water and Manganese Control. American Water Works Association (AWWA) Research Foundation and AWWA. Denver, CO, 2006.

Loewengart, G. 2001. Toxicity of boron to rainbow trout: A weight-of-the-evidence assessment. Environmental Toxicology and Chemistry 20(4):796-803.

Rowe, RI, C Bouzan, S Nabili, and CD Eckhert. 1998. The response of trout and zebrafish embryos to low and high boron concentrations is U-shaped. Biological Trace Element Research 66:261-270.

U.S. Environmental Protection Agency Legacy STORET Data Center Database at http://www.epa.gov/storpubl/legacy/gateway.htm

Respectfully Submitted,



Deborah J. Williams, Assistant Counsel
Division of Legal Counsel
Illinois Environmental Protection Agency

Date: 11/30/10

1021 North Grand Ave. East
Springfield, Illinois 62794
217/782-5544